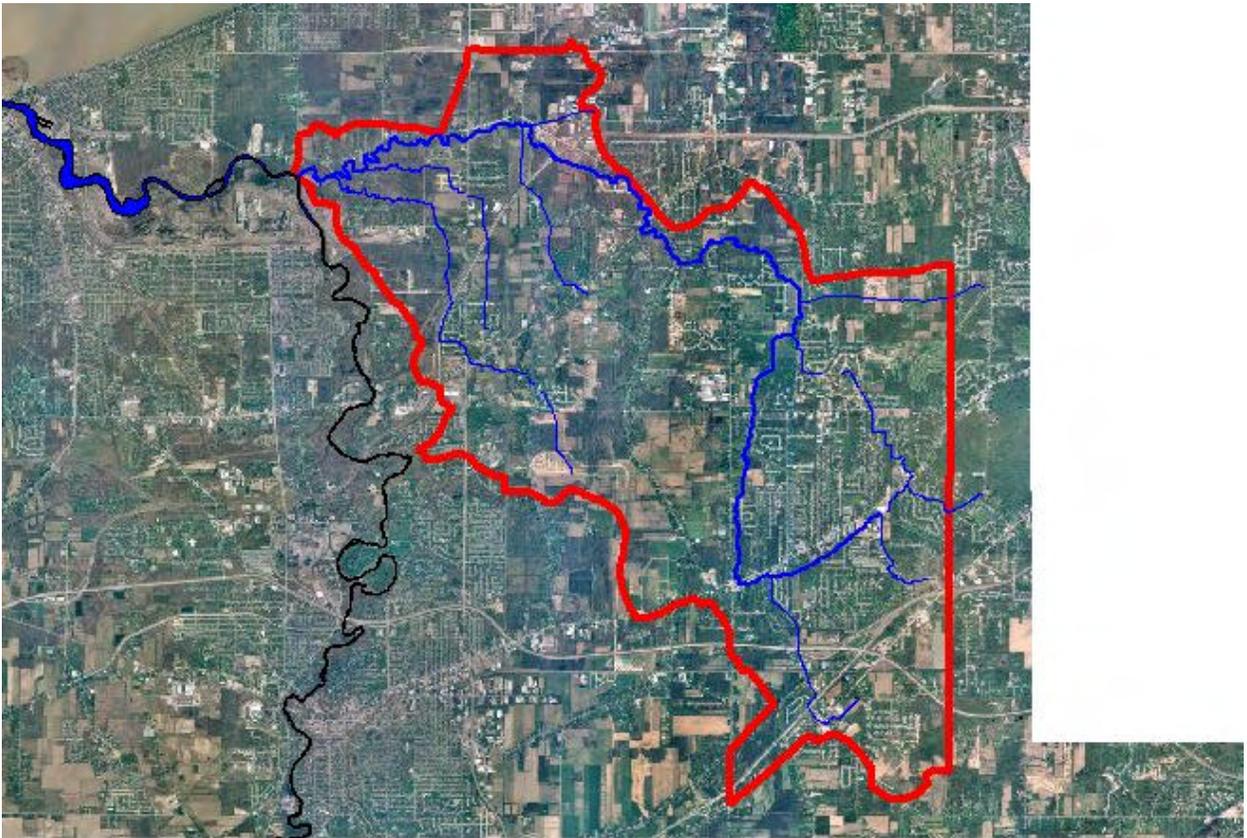


**U.S. Army Corps of Engineers - Buffalo District**

**Black River Area of Concern/Remedial Action  
Plan (AOC/RAP)  
French Creek Watershed Survey  
Lorain County, Ohio**



July 2004

## **TABLE OF CONTENTS**

|                                                                 | <u>Page</u> |
|-----------------------------------------------------------------|-------------|
| LIST OF ACRONYMS                                                | iii         |
| 1.0 INTRODUCTION                                                | 1           |
| 1.1 Study Authority                                             | 1           |
| 1.2 Background                                                  | 1           |
| 1.3 Study Participants and Coordination                         | 2           |
| 2.0 STUDY RESULTS                                               | 3           |
| 2.1 Methods                                                     | 3           |
| 2.2 Study Findings                                              | 6           |
| 2.2.1 QHEI Survey Results                                       | 6           |
| 2.2.1.1 River Mile 0.1 – 6.9                                    | 7           |
| 2.2.1.2 River Mile 7.65 – 14.1                                  | 9           |
| 2.2.2 Water Quality Data and Trends                             | 11          |
| 2.2.3 Priority Areas                                            | 13          |
| 2.2.3.1 French Creek Priority Areas                             | 13          |
| 2.2.3.2 Tributary Priority Areas                                | 14          |
| 3.0 RECOMMENDATIONS                                             | 17          |
| 3.1 French Creek – Main Stem                                    | 17          |
| 3.1.1 Mouth of Creek to East River Road (RMs 0.0 - 0.54)        | 17          |
| 3.1.2 East River Road to Abbe Road (RMs 0.54 - 3.2)             | 17          |
| 3.1.3 Abbe Road to I-90 (RMs 3.2 - 4.5)                         | 17          |
| 3.1.4 I-90 to Detroit Road (RMs 4.5 - 6.1)                      | 17          |
| 3.1.5 Detroit Road to Stony Ridge Road (RMs 6.1 - 6.9)          | 17          |
| 3.1.6 Stony Ridge Road to Center Road (RMs 6.9 - 7.65)          | 18          |
| 3.1.7 Center Road to Riegelsberger Road (RMs 7.65 - 8.9)        | 18          |
| 3.1.8 Riegelsberger Road to Mills Road (RMs 8.9 - 10.4)         | 18          |
| 3.1.9 Mills Road to Center Ridge Road (RMs 10.4 - 12.4)         | 18          |
| 3.1.10 Center Ridge Road to Lear-Nagle Road (RMs 12.4 - 14.1)   | 18          |
| 3.1.11 Lear-Nagle Road to Cuyahoga County line (RMs 14.1 - end) | 19          |
| 3.2 Tributaries                                                 | 19          |
| 3.2.1 Quarry Ditch                                              | 19          |
| 3.2.2 Jungbluth Ditch                                           | 19          |
| 3.2.3 Walker Ditch                                              | 19          |
| 3.2.4 Kline Ditch                                               | 19          |
| 3.2.5 Avins Ditch                                               | 19          |
| 3.2.6 Schwartz Ditch                                            | 19          |
| 3.2.7 Mills Creek                                               | 20          |
| 3.2.8 French Ditch                                              | 20          |
| 3.2.9 Nagle Ditch                                               | 20          |
| 3.3 Watershed-wide Recommendations                              | 20          |
| 4.0 CONCLUSIONS                                                 | 21          |
| 5.0 REFERENCES                                                  | 22          |

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

---

List of Figures

|                                                                    | <u>Page</u> |
|--------------------------------------------------------------------|-------------|
| Figure 1: French Creek Watershed                                   | 4           |
| Figure 2: Schematic of the French Creek Watershed with QHEI Scores | 7           |
| Figure 3: French Creek – River Miles 0 – 7                         | 8           |
| Figure 4: French Creek – River Miles 7 – 14                        | 10          |

List of Tables

|                                      | <u>Page</u> |
|--------------------------------------|-------------|
| Table 1: Survey Sampling Locations   | 4           |
| Table 2: Water Quality Sampling Data | 12          |

List of Photographs

|                                                                             | <u>Page</u> |
|-----------------------------------------------------------------------------|-------------|
| Photograph 1: French Creek at RM 10.4 (Mills Road)                          | 13          |
| Photograph 2: Rust-colored discharge noted near RM 12.4 (Center Ridge Road) | 14          |
| Photograph 3: Construction impacts along Schwartz Ditch                     | 15          |
| Photograph 4: Detention basin/ponding within Mills Creek                    | 15          |
| Photograph 5: Black contaminant pool located along Kline Ditch              | 16          |

Appendices

|                                                      |
|------------------------------------------------------|
| Appendix A: QHEI Matrix Table                        |
| Appendix B: Field notes, Photographs and Data Sheets |

**LIST OF ACRONYMS**

|         |                                                       |
|---------|-------------------------------------------------------|
| AOC     | Area of Concern                                       |
| BMP     | Best Management Practice                              |
| BRCC    | Black River RAP Coordinating Committee                |
| DO      | Dissolved Oxygen                                      |
| HHEI    | Primary Headwaters Habitat Evaluation Index           |
| HSDS    | Home Sewage Disposal System                           |
| LRW     | Limited Resource Water                                |
| MWH     | Modified Warmwater Habitat                            |
| N/SPDES | National/State Pollutant Discharge Elimination System |
| OEPA    | Ohio Environmental Protection Agency                  |
| ORAM    | Ohio Rapid Assessment Method                          |
| QHEI    | Qualitative Habitat Evaluation Index                  |
| RAP     | Remedial Action Plan                                  |
| RM      | River Mile                                            |
| USACE   | United States Army Corps of Engineers                 |
| USDA    | United States Department of Agriculture               |
| USDOI   | United States Department of Interior                  |
| USEPA   | United State Environmental Protection Agency          |
| WWH     | Warmwater Habitat                                     |

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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## **1.0 INTRODUCTION**

### **1.1 Study Authority**

The following report and associated work conducted by the U. S. Army Corps of Engineers – Buffalo District (USACE) has been authorized under the Water Resources Development Act of 1990, as amended. This Act authorizes the USACE to support the development and implementation of Remedial Action Plans (RAP) at designated Areas of Concern (AOC) on the Great Lakes within the United States. Specifically, Section 401 of the Water Resources Development Act of 1990 (Public Law 101-640) authorizes the USACE to provide technical, planning, and engineering assistance to States and local governments in the development and implementation of RAPs for AOCs in the Great Lakes identified under the Great Lakes Water Quality Agreement of 1978.

### **1.2 Background**

In 1978, the Great Lakes Water Quality Agreement between the U.S. and Canada defined persistently polluted trouble spots in the Great Lakes as AOCs. It also recommended the development of AOC-specific RAPs, which comprise a comprehensive ecosystem approach to restoring and protecting an AOC in order to define corrective measures to restore all beneficial uses to each AOC. In 1990, the entire Black River watershed was designated as an AOC. The Black River AOC is the only AOC in Ohio that has designated the entire watershed.

The Black River watershed, located in north-central Ohio, covers 467 square kilometers (180 square miles). The watershed is located primarily in Lorain County, but includes drainage from Medina, Ashland, Huron, and Cuyahoga counties and includes the municipalities of Lorain and Elyria. The east and west branches of the Black River join within Cascade Park in the city of Elyria to form the main channel. The main stem of the Black River then flows 16 miles north and discharges into Lake Erie at the port of the city of Lorain. The only major tributary to this 16-mile reach of the river is French Creek, which flows west and enters the Black River about five miles from its mouth.

Overall, 51% of the land within the AOC is used for agriculture, while only 1% is truly industrial. Between these two extremes are rural (38%), urban residential (7%) and commercial uses (3%). The problems associated with land use within the AOC vary widely from heavily urban areas to rural agricultural spaces. Industrial and municipal wastewater discharges have improved from the past, but nevertheless continue to impact water quality. Non-point source pollution and specific land uses exhibit increasingly pronounced impacts to the Black River water quality. Of specific concern is the problem of low dissolved oxygen (DO) concentrations in the lower reaches of the Black River. This problem has been experienced mainly in the last five miles of the river, a stretch that is dredged for ship traffic. It is suspected that interrelationships of many environmental impacts are causing the low DO levels. The impacts considered here include:

1. The combined pollutant loadings of three municipal wastewater treatment facilities and one steel mill;

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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2. The non-point source loadings of sediment, nutrients and other chemicals from the urban, the developing suburban, and the upstream agricultural areas;
3. Pollutant loadings of nutrients and bacteria from combined sewer overflows;
4. Pollutant loadings of nutrients and bacteria from failed and failing home sewage disposal systems (HSDS).

In an attempt to better understand and address the problem of low DO concentration in the lower reaches of the river, the Black River RAP has requested assistance from the USACE, Buffalo District, to conduct an inventory study of the French Creek sub-watershed.

French Creek is the largest tributary to the Black River main stem. The French Creek sub-watershed is beginning to suffer from the development pressures of urban sprawl from the Cleveland metropolitan area to the East. In addition, French Creek has been suffering from a toxicity source that has not been identified. The toxicity has been evident through both sporadic fish kills and poor fish and macroinvertebrate community biotic indices.

The RAP has requested this watershed inventory study to determine the best means of preservation and/or restoration for this waterway, and to identify the source of toxicity described above, so that remediation efforts can be proffered.

This inventory study may also help determine the contribution of the DO impact items numbered 1 through 4 above. Remediation efforts may then be identified that would remove the toxic effects and alleviate some of the DO impacts associated with the French Creek sub-watershed.

### 1.3 Study Participants and Coordination

The Lorain County General Health District is the non-Federal sponsor for the project. The primary customers are the Lorain County General Health District, the Black River Remedial Action Plan Coordinating Committee (BRCC), and the Ohio Environmental Protection Agency (OEPA). The following individuals/organizations have coordinated the scope of work for the sub-watershed investigation and participated in the study:

#### *Local, State, and Federal Coordinators:*

|                |                                                              |
|----------------|--------------------------------------------------------------|
| Ken Pearce     | Chair, Lorain County General Health District;<br>Chair, BRCC |
| Ted Conlin     | Black River RAP Coordinator, OEPA                            |
| Anthony Friona | Project Manager, USACE – Buffalo District                    |

#### *Principal Investigators:*

|                   |                                     |
|-------------------|-------------------------------------|
| Jay Miller        | Biologist, USACE – Buffalo District |
| Scott Livingstone | Biologist, USACE – Buffalo District |

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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## **2.0 STUDY RESULTS**

### 2.1 Methods

Beginning in the summer of 2002, USACE – Buffalo District personnel initiated a comprehensive survey of the French Creek watershed. The purpose of the survey was to perform evaluations on all of the streams and tributaries within the French Creek watershed utilizing:

- Qualitative Habitat Evaluation Index (QHEI) – used for larger streams,
- Primary Headwater Habitat Evaluation Index (HHEI) – used for smaller streams (with drainage areas of less than 1 square-mile), and

In addition, any adjacent wetland areas were evaluated using the Ohio Rapid Assessment Method (ORAM).

The objective of conducting the QHEI, HHEI and/or ORAM evaluations was to facilitate a comprehensive ‘walk-over’ of the watershed to ascertain baseline conditions of the riverine habitat. By utilizing numeric habitat assessments, such as those noted above, any changes to the habitat ‘health’ of the watershed can be monitored over time.

The initial intent of this evaluation was to identify areas within the watershed where conditions have low impairment, and more importantly, identify areas where conditions exhibit moderate or high impairment. The French Creek survey also provides for the development of recommendations to improve the overall condition of these areas and the watershed as a whole.

The stream segments investigated during this survey included portions of the following (reference Figure 1):

- French Creek
- Unnamed Tributary to French Creek at River Mile 0.38 (Quarry Ditch<sup>1</sup>)
- Jungbluth Ditch (Sugar Creek<sup>2</sup>)
- Walker Ditch (Fish Creek<sup>2</sup>)
- Kline Ditch
- Avins Ditch
- Unnamed Tributary to French Creek at River Mile 8.9 (Schwartz Ditch<sup>1</sup>)
- Mills Creek
- Unnamed Tributary to French Creek at River Mile 12.8 (French Ditch<sup>1</sup>)
- Unnamed Tributary to French Creek at River Mile 14.3 (Nagle Ditch<sup>1</sup>)

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<sup>1</sup> Named given by USACE field personnel – not ‘official’ name

<sup>2</sup> According to the French Creek Reservation Trail Guide

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**



*Figure 1: French Creek Watershed.*

Aerial photographs, existing GIS databases, and traditional paper maps were used to determine potential sampling points for the investigation. Points were selected mainly at road crossings, access trails, or other readily accessible features. A total of 70 locations were identified as potential sampling points, however, actual evaluations were conducted at only 51 of these sites (Table 1). Although formal QHEI/HHEI evaluations were not conducted at the remaining 19 sites, mainly due to lack of access, photographs and general site notes were taken at all 70 sites.

**TABLE 1: Survey Sampling Locations**

| #  | River Code | River Mile | Location                                      |
|----|------------|------------|-----------------------------------------------|
|    |            |            | <b><u>FRENCH CREEK SITES</u></b>              |
| 1  | FC         | 0.1        | Near Mouth (at Black River)                   |
| 2  | FC         | 0.38       | At Mouth of "Quarry" Ditch                    |
| 3  | FC         | 0.54       | At East River Road (mouth of Jungbluth Ditch) |
| 4  | FC         | 1.4        | At FCNP Bridge (mouth of Walker Ditch)        |
| 5  | FC         | 3.2        | At Abbe Road                                  |
| 6  | FC         | 4.0        | At Mouth of Avins Ditch                       |
| 7  | FC         | 4.5        | At I-90 Crossing                              |
| 8  | FC         | 5.5        | At Bridge Point Trail Road                    |
| 9  | FC         | 6.1        | At Detroit Road                               |
| 10 | FC         | 6.9        | At Stony Ridge Road (RTE 611)                 |
| 11 | FC         | 7.65       | At Center Road                                |

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

| #  | River Code | River Mile  | Location                                          |
|----|------------|-------------|---------------------------------------------------|
|    | <i>FC</i>  | <i>8.4</i>  | <i>At Keller Street</i>                           |
| 12 | FC         | 8.9         | At Jaycox Road (Mouth of "Schwartz" Ditch)        |
| 13 | FC         | 10.4        | At Mills Road                                     |
| 14 | FC         | 10.7        | At Chesterfield Avenue                            |
|    | <i>FC</i>  | <i>11.8</i> | <i>At Mildred Street</i>                          |
| 15 | FC         | 12.4        | At Center Ridge Road                              |
| 16 | FC         | 12.7        | At Root Road                                      |
|    | <i>FC</i>  | <i>13.4</i> | <i>At Pitts Blvd</i>                              |
|    | <i>FC</i>  | <i>13.7</i> | <i>At Debbie Drive</i>                            |
| 17 | FC         | 14.1        | Lear-Nagle Road                                   |
|    | <i>FC</i>  | <i>14.3</i> | <i>At Brownstone Lane</i>                         |
|    |            |             | <b>"QUARRY DITCH" SITES</b>                       |
| 18 | QD         | 0.0         | At Mouth of Ditch (French Creek RM 0.38)          |
|    |            |             | <b>JUNGLUTH DITCH SITES</b>                       |
| 19 | JD         | 0.0         | Mouth of Ditch (French Creek RM 0.54)             |
| 20 | JD         | 1.0         | Upstream of Park Road Bridge                      |
| 21 | JD         | 1.6         | At French Creek Road                              |
|    | <i>JD</i>  |             | <i>At Wheaton Drive (College Heights Estates)</i> |
| 22 | JD         | 3.15        | At Abbe Road                                      |
| 23 | JD         | 4.13        | At Case Road                                      |
|    |            |             | <b>WALKER DITCH SITES</b>                         |
| 24 | WD         | 0.0         | Mouth of Ditch (French Creek RM 1.23)             |
| 25 | WD         | 0.6         | At end of FCNP Hiking Trail                       |
| 26 | WD         | 1.7         | At Abbe Road                                      |
| 27 | WD         | 2.2         | At French Creek Road                              |
|    | <i>WD</i>  | <i>3.1</i>  | <i>At Deercreek Court</i>                         |
| 28 | WD         | 3.3         | At Reserve Way                                    |
| 29 | WD         | 3.45        | End - at Reserve Way by Pond                      |
|    |            |             | <b>KLINE DITCH SITES</b>                          |
| 30 | KD         | 0.0         | Mouth of Ditch (French Creek RM 3.9)              |
| 31 | KD         | 0.85        | At Greenfield Drive                               |
| 32 | KD         | 1.22        | At French Creek Road                              |
| 33 | KD         | 2.15        | At Detroit Road                                   |
|    |            |             | <b>AVINS DITCH SITES</b>                          |
| 34 | AD         | 0.0         | Mouth of Ditch (French Creek RM 4.0)              |
| 35 | AD         | 0.47        | At Chester Industrial Parkway                     |
|    |            |             | <b>"SCHWARTZ DITCH" SITES</b>                     |
| 36 | SD         | 0.0         | Mouth of Ditch at Jaycox Road (RM FC-8.9)         |
| 37 | SD         | 0.3         | At Schwartz Park                                  |
| 38 | SD         | 0.52        | At Sandy Lane                                     |
| 39 | SD         | 0.71        | At Nagle Road                                     |
|    | <i>SD</i>  | <i>1.25</i> | <i>At Williams Street</i>                         |
|    | <i>SD</i>  | <i>2.12</i> | <i>At Bradley/Hillard Roads (Cuyahoga County)</i> |
|    |            |             | <b>MILLS CREEK SITES</b>                          |
|    | <i>MC</i>  | <i>0.0</i>  | <i>Mouth of Creek (French Creek RM 9.3)</i>       |
| 40 | MC         | 0.22        | At Jaycox Road                                    |
|    | <i>MC</i>  | <i>0.75</i> | <i>At St. Maron Blvd.</i>                         |
| 41 | MC         | 1.32        | At Nagle Road                                     |
| 42 | MC         | 1.55        | At Mills Road                                     |
| 43 | MC         | 2.5         | At Mills Creek Lane (in sports park)              |

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

| #  | River Code | River Mile  | Location                                     |
|----|------------|-------------|----------------------------------------------|
| 44 | MC         | 2.7         | At Center Ridge Road                         |
| 45 | MC         | 3.21        | At Woodland Drive                            |
| 46 | MC         | 3.45        | At Fieldstone Circle                         |
|    | <i>MC</i>  | <i>3.79</i> | <i>At Barton Road</i>                        |
|    | <i>MC</i>  | <i>3.95</i> | <i>At Bradley Road</i>                       |
|    |            |             | <b>"FRENCH DITCH" SITES</b>                  |
| 47 | FD         | 0.0         | Mouth of Ditch (French Creek RM 12.85)       |
| 48 | FD         | 0.5         | At Bainbridge Road                           |
| 49 | FD         | 1.3         | At Chestnut Ridge Road                       |
| 50 | FD         | 1.93        | At Lorain Road                               |
|    | <i>FD</i>  | <i>2.1</i>  | <i>At Root Road (2)</i>                      |
|    |            |             | <b>"NAGLE DITCH" SITES</b>                   |
|    | <i>ND</i>  | <i>0.0</i>  | <i>Mouth of Ditch (French Creek RM 14.3)</i> |
| 51 | ND         | 0.37        | At Boulder Drive                             |
|    | <i>ND</i>  | <i>0.65</i> | <i>At Lear-Nagle Road</i>                    |
|    | <i>ND</i>  | <i>0.92</i> | <i>At Lear-Nagle Road</i>                    |
|    | <i>ND</i>  | <i>1.0</i>  | <i>At Chestnut Ridge Road</i>                |
|    | <i>ND</i>  | <i>1.54</i> | <i>At Lorain Road</i>                        |

NOTES: River Miles (RM's) for most of the ditches as well as the four most upstream French Creek sites have been estimated using ArcView in conjunction with the 1999 aerial maps. These estimated RM's are not intended to replace the official RM's contained on OEPA's official RM maps, but are instead being used as a reference point for the purposes of these investigations (as actual RM's were unavailable). Likewise, due to discrepancies between several different maps and the lack of assigned names on some creeks, waterway names in quotation marks were assigned by USACE for reference purposes only.

*No QHEI/HHEI conducted at sites where names above are depicted in red italics.*

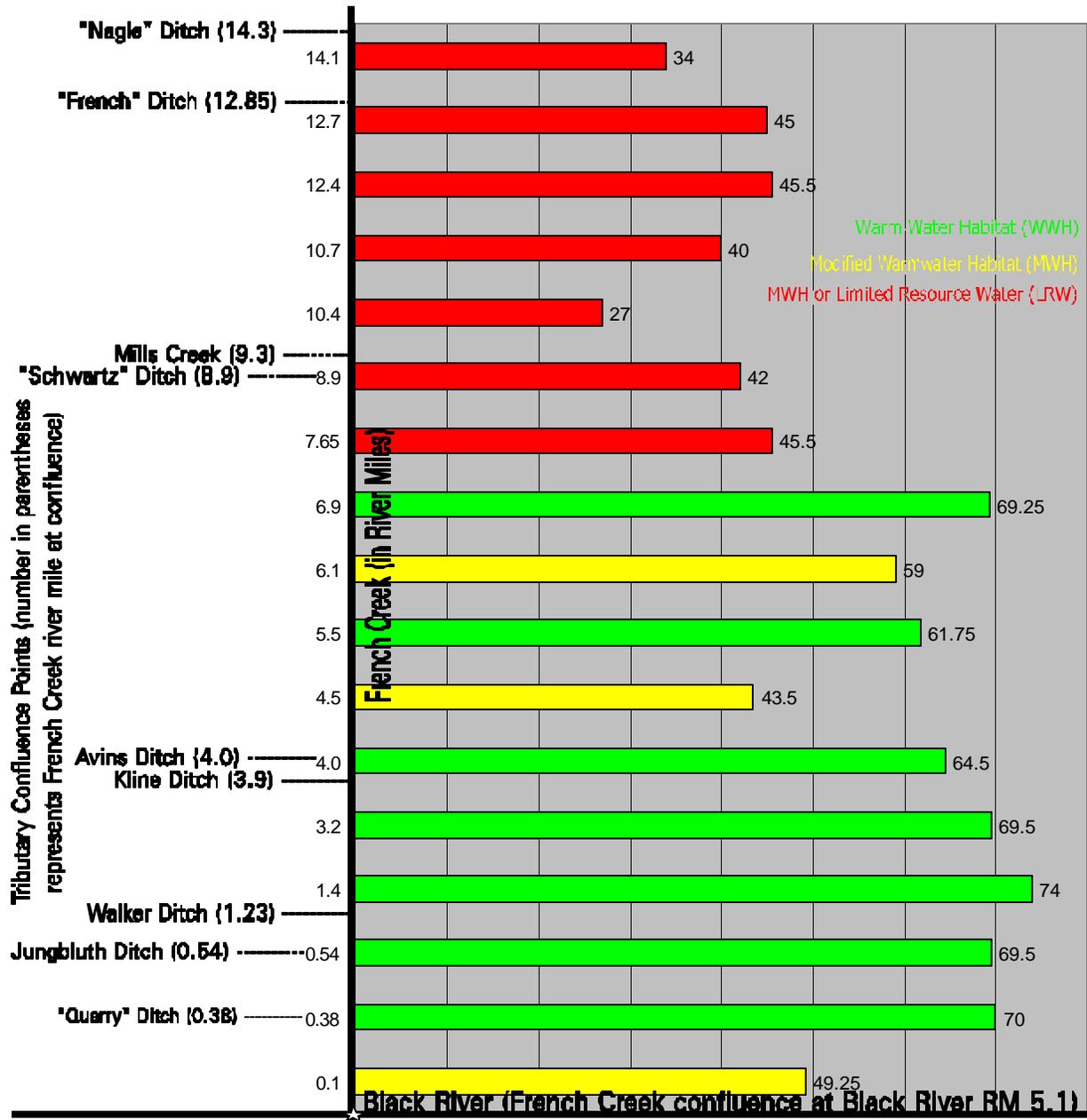
## 2.2 Study Findings

Appendix A contains a QHEI matrix table which lists all of the sites investigated along with their respective river mile location, QHEI score, and site gradient. The table additionally lists the QHEI matrix attributes that are indicative of a warm water habitat (WWH) or modified warm water habitat (MWH), both high and moderate influence, and depicts which of these attributes were identified at each site. All site investigation field notes, photographs, and data sheets are attached in Appendix B.

### 2.2.1 QHEI Survey Results

In general, the QHEI survey conducted on French Creek and its tributaries showed a downward trend in QHEI scores, starting from the mouth and progressing upstream through the headwaters of the creek. The sites within the first section (RM's 0.1 – 6.9) of the creek received on average favorable scores which attained the creek's designation as WWH. The second section of the creek (RM's 7.65 – 14.1) received scores that would put the creek in non-attainment of its WWH designation. Figure 2 depicts a schematic of the French Creek watershed, and indicates the QHEI scores attained at each of the French Creek sites. Sections 2.2.1.1 and 2.2.1.2 include a brief description of the findings and observations derived from the survey in the downstream and upstream portions of French Creek, respectively.

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**



*Figure 2: Schematic of the French Creek Watershed with QHEI Scores.*

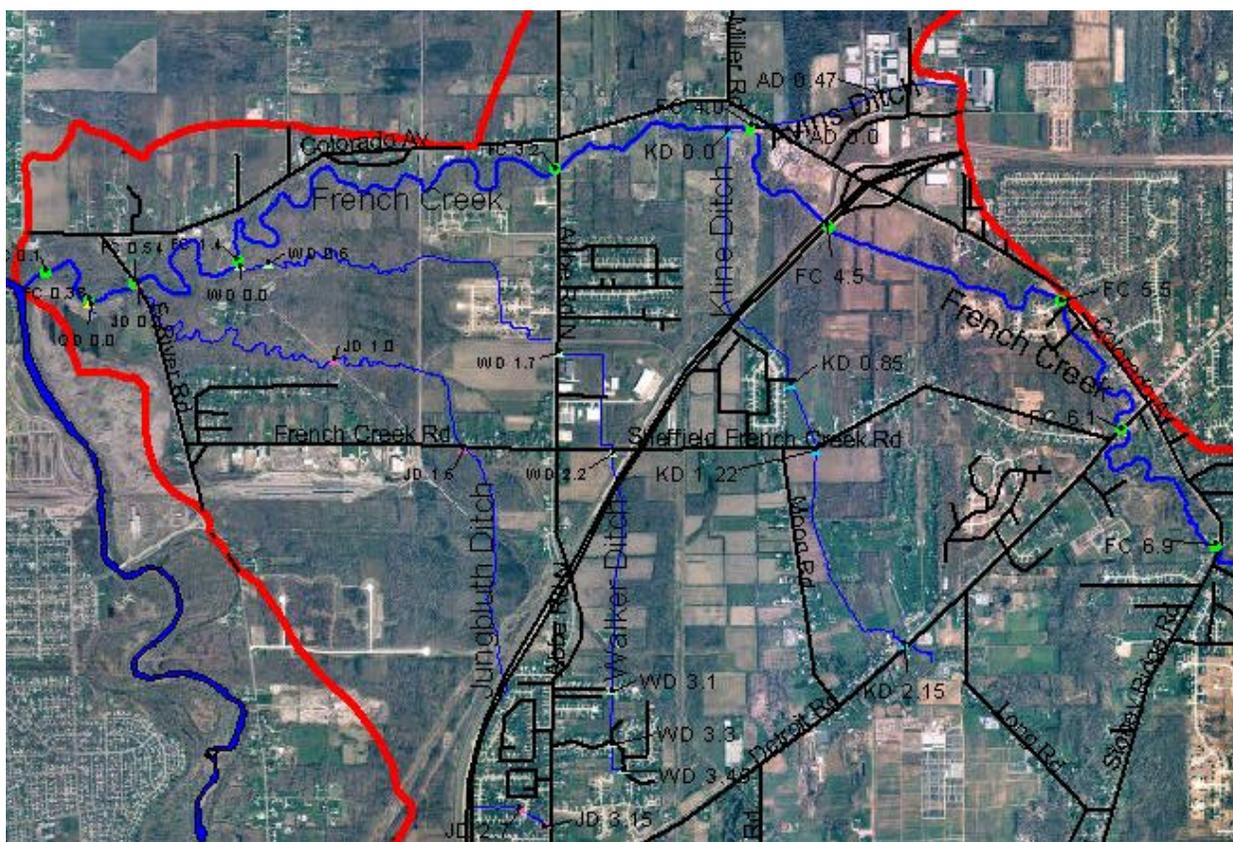
2.2.1.1 River Mile 0.1 through 6.9: With the primary exceptions of the site at the mouth of the creek (RM 0.1) and the site located near the I-90 crossing (RM 4.5), the lower 7 river miles of French Creek received QHEI scores that would be consistent with a designation as WWH, with an average score of 63.3. Figure 3 is an aerial view of the lower 7 miles of French Creek. The site at the mouth of the creek received a low score due to several factors. First, the substrate at the site, while dominated by gravel, was highly embedded with silt. Amplifying this effect is that this portion of the creek is relatively straight, over 1 meter deep, extremely slow moving (back flow effects were also noted from the Black River) and

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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demonstrates no true riffle/pool complex. The combination of these conditions allow for a significant amount of suspended sediment in the creek to settle out in this location, causing the in-water habitat to be impaired.

At the I-90 crossing site, the creek was evidently re-routed for the construction of the I-90 and also maintains a glide habitat. Due to the relocation of the creek, the area is almost completely straight, and demonstrates moderate silt embeddedness, low velocity, and little riffle/pool complex. This portion of the creek is adjacent to a fly-ash disposal area and is in close proximity to two large gas stations, one of which had a large fuel spill which discharged into the creek in December 2002.



*Figure 3: French Creek – River Miles 0 - 7*

The majority of the lower portion of the creek flows through areas with low-density development and open space (such as the Lorain County Metro Parks - French Creek Reservation) and is of relatively good quality. In general, this portion of the creek has moderate to wide riparian buffers zones (over 10 meters), dominated by forested and/or old-field habitat. Substrates in this portion of the creek were dominated by cobble, gravel, sand and bedrock with normal levels of silt embeddedness. Because the creek flows through areas with wide to moderate riparian buffers, in-stream cover was generally good, and reasonable channel development with deep pools (over 70 cm) and riffles (over 10 cm) dominated.

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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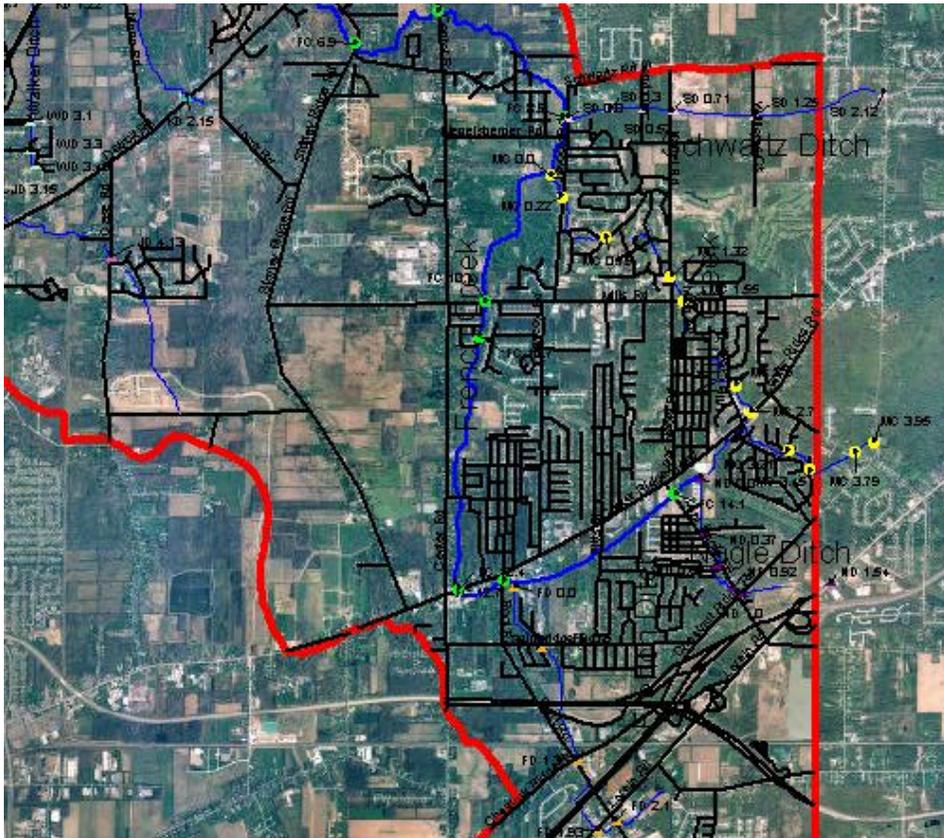
Adjacent riparian habitat was also of good quality. Plants such as black willow (*Salix nigra*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), boxelder (*Acer negundo*), pin oak (*Quercus palustris*), red oak (*Quercus rubra*), eastern cottonwood (*Populus deltoides*), American sycamore (*Platanus occidentalis*), American beech (*Fagus grandifolia*), black cherry (*Prunus serotina*), green ash (*Fraxinus pennsylvanica*), red cardinal flower (*Lobelia cardinalis*), duckweed (*Spirodela polyrhiza*), rice cutgrass (*Leersia oryzoides*), arrowhead (*Sagittaria spp.*), cattails (*Typha spp.*), softstem bulrush (*Scirpus validus*), and other sedges and rushes were noted both within the creek and along the banks. Two wetlands were also identified within this portion of the watershed. One is connected to French Creek by “Quarry” Ditch at RM 0.38 and is an approximately 23-acre wetland created by past quarry mining activities. The other is located near the northwest corner of the intersection of French Creek and East River Road. This wetland is a small (around 2.5 acres) forested floodplain wetland, which is seasonally flooded by French Creek.

Although this portion of the main stem of French Creek is of relatively good quality, some unfavorable issues were noted in the five tributaries to French Creek in this section of the watershed. These tributaries include “Quarry” Ditch (at RM 0.38), Jungbluth Ditch (at RM 0.54), Walker Ditch (at RM 1.23), Kline Ditch (at RM 3.9), and Avins Ditch (at RM 4.0). A total of 20 sites were investigated on these tributaries, and 15 of the 20 sites received QHEI scores that were well below the level required for the attainment of WWH designation, with an average score of 47. The only sites that received QHEI scores above the level required for WWH designation attainment were the two most downstream sites taken at both Jungbluth and Walker Ditch where they flow through the French Creek Reservation, and the most downstream site taken at Kline Ditch. The primary problems identified at the remaining sites were associated with extensive residential development. Most sites had little, if any, riparian buffer areas and were maintained (mown grass) up to the streambanks. In many cases, the streams had been re-routed or culverted to accommodate development, or were ‘ponded’ into retention basins. Several instances were noted where construction was ongoing and little, if any, protection was offered to the streams from the impacts of the construction site. These issues are causing significant run-off and sedimentation directly into the streams, are impacting and/or eliminating in-stream habitat and are also having an adverse effect on water quality.

2.2.1.2 River Mile 7.65 through 14.3: The sites on the main stem of French Creek investigated in this portion of the watershed all received scores that indicates non-attainment of its WWH designation. The average QHEI score of the sites in this portion of French Creek was 39.9. These scores indicate that this portion of the creek has scores representing MWH, or in some cases limited resource waters (LRW). This portion of the watershed is developed to a greater extent than the downstream portions, and is dominated by residential and commercial uses. Figure 4 is an aerial view of RMs 7 - 14 of French Creek.

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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*Figure 4: French Creek River Miles 7–14.*

Due to the residential and commercial nature of this portion of the watershed, the primary water quality and river habitat problem noted was the lack of riparian buffers. In most cases, riparian buffers measured less than 5 meters in width, and in many cases no buffer was present. The lack of adequate buffers leads to very flashy storm flows, increased riverbank erosion and increased run-off and sedimentation, which were noted in substrate evaluations. While some moderate amounts of cobble, gravel, and bedrock were present at many of the sites, a predominance of silt and sand substrates was evident. Also attributable to the lack of riparian buffers was a general lack of high quality in-stream cover in this portion of the creek. Most sites investigated within the creek also were channelized, re-routed, or otherwise altered to accommodate residential and commercial development, which has impacted the creek's sinuosity and development of riffle/pool complexes. Riffles and pools tended to be much shallower in this portion of the watershed, also.

Similarly to the mainstem, the sites investigated in the tributaries to French Creek in this portion of the watershed also received QHEI scores that would put them in non-attainment of WWH designation. Four main tributaries flow into French Creek in this portion of the watershed, as follows: "Schwartz" Ditch (at RM 8.9), Mills Creek (at RM 9.3), "French" Ditch (at RM 12.85), and "Nagle" Ditch (at RM 14.3). The average QHEI score of the sites

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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investigated on these tributaries was 42. The main factors contributing to the low scores include extensive development, stream modifications/relocation, lack of riparian buffers, silt embedded substrates, run-off/sedimentation, and construction impacts.

### *2.2.2 Water Quality Data and Trends*

In late May of 2003, water quality data was collected at most sites where QHEI evaluations were conducted. This data was collected using a Hydrolab field monitor, Hach field tests, and a turbidity meter. Parameters tested during this effort included the following:

- TEM - Water Temperature (F°)
- DO - Dissolved Oxygen (mg/L)
- SPC - Conductivity (mS/cm)
- SAL - Salinity (ppt)
- pH
- ORP - Redox Potential
- NH3 - Ammonia Nitrogen (mg/L)
- F-Cl - Free Chlorine (mg/L)
- T-Cl - Total Chlorine (mg/L)
- PO4 - Phosphate (mg/L)
- P - Phosphorus (mg/L)
- N - Nitrate nitrogen (mg/L)
- NO3 - Nitrate (mg/L)
- TBD - Turbidity (ntu)

Table 2 contains the numerical results of the water quality data sampling. In general, no significant exceedances of State water quality standards were noted during the water quality data collection effort. The primary parameters that were found to be at levels of some concern included dissolved oxygen and nitrate nitrogen/nitrate.

Several sites throughout the watershed exhibited low levels of dissolved oxygen. Typically, sites that had low dissolved oxygen levels tended to be the ones that also had elevated levels of nitrate nitrogen/nitrate. The lack of riparian buffers, particularly in the upstream portion of the watershed, allows the elevated levels of nitrogen to enter the river system. Urban runoff containing high levels of fertilizers, organic matter and other compounds containing nitrogen is carried to the creek virtually unfiltered in many cases, and is likely a primary cause for the elevated nitrogen levels. As a consequence, the elevated nitrate nitrogen/nitrate is promoting algal and other undesirable plant growth. While these organisms create oxygen through photosynthesis, they also consume large amounts of DO through respiration and decomposition. Since photosynthesis can only take place during periods with sunlight, and respiration and decomposition occur 24 hours a day, an overabundance of plant growth and organic matter can often reduce DO levels in the water. Exasperating this effect, the lack of buffers in the upper portions of the watershed greatly reduces shading in the water, causing higher water temperatures. Warmer water becomes saturated more easily with oxygen, meaning warmer water can hold less DO, and less is available to aquatic organisms. Elevated turbidity levels

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

were also noted at several sites. This is caused by the introduction of silt-laden runoff that is introduced to the creek and also from bank erosion caused by flashy storm flows, both of which are a direct result of a lack of adequate buffers.

**Table 2: Water Quality Sampling Data**

| FRENCH CREEK SITES     |                                                     | TEM        | DO        | SPC        | SAL        | pH        | ORP        | NH3        | F-CI        | T-CI        | PO4       | P        | N        | NO3        | TBD        |
|------------------------|-----------------------------------------------------|------------|-----------|------------|------------|-----------|------------|------------|-------------|-------------|-----------|----------|----------|------------|------------|
| RM                     | Location                                            | (°F)       | (mg/L)    | (mS/cm)    | (ppt)      |           |            | (mg/L)     | (mg/L)      | (mg/L)      | (mg/L)    | (mg/L)   | (mg/L)   | (mg/L)     | (ntu)      |
| 0.38                   | At Mouth of Un-named Ditch                          | 63.8       | 13.9      | 0.7860     | 0.41       | 7.01      | 342        | 0.00       | 0.00        | 0.20        | 0.24      | 0.08     | 0.3      | 1.32       | 3.8        |
| 0.54                   | At East River Road (mouth of Jungbluth Ditch)       | 55.6       | 7.05      | 0.8140     | 0.42       | 6.69      | 169        | 0.01       | 0.15        | 0.18        | 0.02      | 0.0066   | 0.5      | 2.2        | 3.8        |
| 1.4                    | At FCNP Bridge (mouth of Walker Ditch)              | 55.7       | 7.8       | 0.8189     | 0.43       | 6.40      | 171        | 0.01       | 0.10        | 0.1         | 0.01      | 0.0033   | 1        | 4.4        | 4.4        |
| 3.2                    | At Abbe Road                                        | 66.3       | 10.23     | 0.8654     | 0.45       | 6.60      | 173        | 0.00       | 0.00        | 0.1         | 0.13      | 0.04     | 0.5      | 2.2        | 4.7        |
| 4.0                    | At Mouth of Avins Ditch                             | 71.7       | 10.5      | 0.8813     | 0.46       | 6.61      | 166        | 0.00       | 0.10        | 0.1         | 0.12      | 0.04     | 0        | 0          | 3.6        |
| 4.5                    | At I-90 Crossing                                    | 55         | 8.1       | 0.9189     | 0.48       | 7.27      | 354        | 0.02       | 0.00        | 0           | 0.02      | 0.0067   | 0.33     | 1.45       | 9.1        |
| 5.5                    | At Bridge Point Trail Road                          | 55.6       | 8.91      | 0.9198     | 0.48       | 7.24      | 347        | 0.00       | 0.10        | 0.1         | 0.02      | 0.0067   | 0.2      | 0.88       | 5.8        |
| 6.1                    | At Detroit Road                                     | 56         | 7.2       | 0.9203     | 0.48       | 7.20      | 340        | 0.00       | 0.00        | 0           | 0.02      | 0.0067   | 0        | 0          | 7.7        |
| 6.9                    | At Stony Ridge Road (RTE 511)                       | 56.8       | 7.8       | 0.9420     | 0.49       | 7.24      | 334        | 0.20       | 0.20        | 0.15        | 0.36      | 0.13     | 0.2      | 0.88       | 11         |
| 7.65                   | At RTE 83 (Center Road)                             | 57.5       | 5.7       | 0.9575     | 0.50       | 7.20      | 333        | 0.00       | 0.05        | 0.08        | 0.02      | 0.0067   | 0.5      | 2.2        | 18         |
| 8.9                    | At Jaycox Road (Mouth of "Schwartz" Ditch)          | 53.8       | 8.3       | 0.8984     | 0.47       | 7.25      | 309        | 0.00       | 0.10        | 0.07        | 0.02      | 0.0067   | 0.1      | 0.44       | 17         |
| 10.4                   | At Mills Road                                       | 71.4       | 12.25     | 0.9551     | 0.50       | 7.29      | 203        | 0.30       | 0.10        | 0.15        | 0.44      | 0.14     | 0        | 0          | 6.8        |
| 10.7                   | At Chesterfield Avenue                              | 67.8       | 12.2      | 0.9501     | 0.50       | 7.22      | 195        | 0.20       | 0.10        | 0.1         | 0.42      | 0.14     | 2        | 8.8        | 6.8        |
| 12.4                   | At Center Ridge Road                                | 58.3       | 7.14      | 1.0570     | 0.55       | 7.27      | 181        | 0.00       | 0.00        | 0           | 0         | 0        | 0        | 0          | 8.3        |
| 12.7                   | At Root Road                                        | 59.9       | 8.2       | 1.0330     | 0.54       | 6.95      | 205        | 0.00       | 0.10        | 0.1         | 0         | 0        | 0        | 0          | 6.2        |
| 14.1                   | Lear-Nagle Road                                     | 59.8       | 7.2       | 0.8334     | 0.43       | 6.92      | 165        | 0.20       | 0.05        | 0.07        | 0.5       | 0.167    | 1        | 4.4        | 21         |
| <b>QUARRY DITCH</b>    |                                                     | <b>TEM</b> | <b>DO</b> | <b>SPC</b> | <b>SAL</b> | <b>pH</b> | <b>ORP</b> | <b>NH3</b> | <b>F-CI</b> | <b>T-CI</b> | <b>PO</b> | <b>P</b> | <b>N</b> | <b>NO3</b> | <b>TBD</b> |
| RM                     | Location                                            | (°F)       | (mg/L)    | (mS/cm)    | (ppt)      |           |            | (mg/L)     | (mg/L)      | (mg/L)      | (mg/L)    | (mg/L)   | (mg/L)   | (mg/L)     | (ntu)      |
| 0.0                    | At Mouth of Ditch (French Creek RM 0.38)            | 64.2       | 11.63     | 0.7027     | 0.37       | 7.13      | 302        | 0.00       | 0.15        | 0.15        | 0.13      | 0.043    | 0.4      | 1.76       | 7.3        |
| 0.2                    |                                                     | 64.4       | 13.33     | 0.3608     | 0.18       | 7.31      | 226        | 0.00       | 0.20        | 0.15        | 0.2       | 0.066    | 0.1      | 0.44       | 26         |
| <b>JUNGBLUTH DITCH</b> |                                                     | <b>TEM</b> | <b>DO</b> | <b>SPC</b> | <b>SAL</b> | <b>pH</b> | <b>ORP</b> | <b>NH3</b> | <b>F-CI</b> | <b>T-CI</b> | <b>PO</b> | <b>P</b> | <b>N</b> | <b>NO3</b> | <b>TBD</b> |
| RM                     | Location                                            | (°F)       | (mg/L)    | (mS/cm)    | (ppt)      |           |            | (mg/L)     | (mg/L)      | (mg/L)      | (mg/L)    | (mg/L)   | (mg/L)   | (mg/L)     | (ntu)      |
| 0.0                    | Mouth of Ditch (French Creek RM 0.54)               | 55.5       | 8.07      | 0.7850     | 0.41       | 6.67      | 169        | 0.02       | 0.03        | 0.05        | 0.01      | 0.0033   | 0.3      | 1.32       | 5.4        |
| 1.0                    | Upstream of Park Road Bridge                        | 54.8       | 8.7       | 0.8718     | 0.45       | 6.37      | 159        | 0.00       | 0.15        | 0.1         | 0.08      | 0.026    | 0        | 0          | 8.3        |
| 1.6                    | At French Creek Road                                | 54.9       | 9.2       | 0.8727     | 0.45       | 6.38      | 170        | 0.00       | 0.17        | 0.15        | 0.06      | 0.02     | 0.25     | 1.1        | 7.7        |
| 3.15                   | At Abbe Road                                        | 60.4       | 12.4      | 0.5958     | 0.31       | 6.58      | 77         | 0.10       | 0.15        | 0.2         | 0.48      | 0.16     | 0        | 0          | 8.6        |
| 4.13                   | At Case Road                                        | 63.8       | 10.4      | 0.5354     | 0.27       | 6.58      | 70         | 0.00       | 0.40        | 0.2         | 0.4       | 0.13     | 0.2      | 0.88       | 8.8        |
| <b>WALKER DITCH</b>    |                                                     | <b>TEM</b> | <b>DO</b> | <b>SPC</b> | <b>SAL</b> | <b>pH</b> | <b>ORP</b> | <b>NH3</b> | <b>F-CI</b> | <b>T-CI</b> | <b>PO</b> | <b>P</b> | <b>N</b> | <b>NO3</b> | <b>TBD</b> |
| RM                     | Location                                            | (°F)       | (mg/L)    | (mS/cm)    | (ppt)      |           |            | (mg/L)     | (mg/L)      | (mg/L)      | (mg/L)    | (mg/L)   | (mg/L)   | (mg/L)     | (ntu)      |
| 0.0                    | Mouth of Ditch (French Creek RM 1.23)               | 53.5       | 9.93      | 0.5916     | 0.30       | 6.43      | 165        | 0.05       | 0.02        | 0.02        | 0.01      | 0.0033   | 1.2      | 5.25       | 4.1        |
| 0.6                    | At end of FCNP Hiking Trail                         | 54.2       | 9.36      | 0.6234     | 0.32       | 6.41      | 163        | 0.00       | 0.10        | 0.15        | 0.08      | 0.026    | 4        | 17.6       | 4.2        |
| 1.7                    | At Abbe Road                                        | 51.5       | 7.3       | 0.5640     | 0.29       | 6.42      | 275        | 0.05       | 0.15        | 0.15        | 0.02      | 0.0067   | 0.1      | 0.44       | 3          |
| 2.2                    | At French Creek Road                                | 54.3       | 5.6       | 0.6932     | 0.36       | 6.42      | 153        | 0.20       | 0.10        | 0.1         | 0.001     | 0.0033   | 0        | 0          | 4.9        |
| 3.3                    | At Reserve Way                                      | 55.8       | 7.6       | 0.8527     | 0.44       | 6.46      | 168        | 0.05       | 0.01        | 0.01        | 0.08      | 0.25     | 2.5      | 1.1        | 110        |
| 3.45                   | End - at Reserve Way by Pond                        | 53         | 7.03      | 1.2960     | 0.69       | 6.35      | 189        | 0.10       | 0.10        | 0.1         | 0.06      | 0.02     | 1.5      | 6.8        | 22         |
| <b>KLINE DITCH</b>     |                                                     | <b>TEM</b> | <b>DO</b> | <b>SPC</b> | <b>SAL</b> | <b>pH</b> | <b>ORP</b> | <b>NH3</b> | <b>F-CI</b> | <b>T-CI</b> | <b>PO</b> | <b>P</b> | <b>N</b> | <b>NO3</b> | <b>TBD</b> |
| RM                     | Location                                            | (°F)       | (mg/L)    | (mS/cm)    | (ppt)      |           |            | (mg/L)     | (mg/L)      | (mg/L)      | (mg/L)    | (mg/L)   | (mg/L)   | (mg/L)     | (ntu)      |
| 0.0                    | Mouth of Ditch (French Creek RM 3.9)                | 69.3       | 11.9      | 0.6344     | 0.33       | 6.60      | 210        | 0.00       | 0.00        | 0           | 0.14      | 0.047    | 5        | 22         | 4          |
| 0.85                   | At Greenfield Drive                                 | 62.8       | 13.3      | 0.7049     | 0.36       | 6.52      | 167        | 0.00       | 0.20        | 0.15        | 0.14      | 0.048    | 2.8      | 12.32      | 7.5        |
| 1.22                   | At French Creek Road                                | 54.2       | 10.07     | 0.7387     | 0.38       | 6.41      | 51         | 0.00       | 0.10        | 0.1         | 0.14      | 0.047    | 0.3      | 1.32       | 7.6        |
| 2.15                   | At Detroit Road                                     | 59         | 13.52     | 0.4121     | 0.21       | 6.54      | 139        | 0.00       | 0.20        | 0.2         | 0.18      | 0.06     | 0.1      | 0.44       | 6          |
| <b>AVINS DITCH</b>     |                                                     | <b>TEM</b> | <b>DO</b> | <b>SPC</b> | <b>SAL</b> | <b>pH</b> | <b>ORP</b> | <b>NH3</b> | <b>F-CI</b> | <b>T-CI</b> | <b>PO</b> | <b>P</b> | <b>N</b> | <b>NO3</b> | <b>TBD</b> |
| RM                     | Location                                            | (°F)       | (mg/L)    | (mS/cm)    | (ppt)      |           |            | (mg/L)     | (mg/L)      | (mg/L)      | (mg/L)    | (mg/L)   | (mg/L)   | (mg/L)     | (ntu)      |
| 0.0                    | Mouth of Ditch (French Creek RM 4.0)                | 68.6       | 8.72      | 1.2340     | 0.65       | 6.59      | 183        | 0.00       | 0.00        | 0.2         | 0.56      | 0.18     | 0        | 0          | 31         |
| <b>SCHWARTZ DITCH</b>  |                                                     | <b>TEM</b> | <b>DO</b> | <b>SPC</b> | <b>SAL</b> | <b>pH</b> | <b>ORP</b> | <b>NH3</b> | <b>F-CI</b> | <b>T-CI</b> | <b>PO</b> | <b>P</b> | <b>N</b> | <b>NO3</b> | <b>TBD</b> |
| RM                     | Location                                            | (°F)       | (mg/L)    | (mS/cm)    | (ppt)      |           |            | (mg/L)     | (mg/L)      | (mg/L)      | (mg/L)    | (mg/L)   | (mg/L)   | (mg/L)     | (ntu)      |
| 0.0                    | Mouth of Ditch at Jaycox Road (French Creek RM 8.9) | 56.2       | 8.1       | 0.9756     | 0.51       | 7.17      | 283        | 0.05       | 0.05        | 0.05        | 0.02      | 0.0067   | 0        | 0          | 6.7        |
| 0.3                    | At Schwartz Park                                    | 54.8       | 11.19     | 0.8951     | 0.47       | 7.12      | 227        | 0.00       | 0.10        | 0.15        | 0.06      | 0.02     | 0.2      | 0.88       | 5.6        |
| 0.52                   | At Sandy Lane                                       | 55         | 12.4      | 0.8890     | 0.46       | 7.23      | 228        | 0.10       | 0.15        | 0.15        | 0         | 0        | 0.1      | 0.44       | 5.9        |
| 0.71                   | At Nagle Road                                       | 59.5       | 12.7      | 0.8846     | 0.45       | 7.23      | 215        | 0.00       | 0.12        | 0.1         | 0.01      | 0.0033   | 0        | 0          | 8.4        |
| <b>MILLS CREEK</b>     |                                                     | <b>TEM</b> | <b>DO</b> | <b>SPC</b> | <b>SAL</b> | <b>pH</b> | <b>ORP</b> | <b>NH3</b> | <b>F-CI</b> | <b>T-CI</b> | <b>PO</b> | <b>P</b> | <b>N</b> | <b>NO3</b> | <b>TBD</b> |
| RM                     | Location                                            | (°F)       | (mg/L)    | (mS/cm)    | (ppt)      |           |            | (mg/L)     | (mg/L)      | (mg/L)      | (mg/L)    | (mg/L)   | (mg/L)   | (mg/L)     | (ntu)      |
| 0.22                   | At Jaycox Road                                      | 70         | 9.22      | 0.9557     | 0.50       | 7.30      | 175        | 0.00       | 0.00        | 0           | 0         | 0        | 0        | 0          | 6          |
| 1.32                   | At Nagle Road                                       | 67.6       | 11.7      | 0.9734     | 0.51       | 7.28      | 194        | 0.00       | 0.00        | 0           | 0.01      | 0.0033   | 0        | 0          | 4.9        |
| 1.55                   | At Mills Road                                       | 68.1       | 10.98     | 0.9923     | 0.52       | 7.23      | 192        | 0.00       | 0.00        | 0           | 0.01      | 0.0033   | 1        | 4.4        | 4.2        |
| 2.5                    | At Mills Creek Lane (n football park)               | 68.2       | 14.7      | 0.9612     | 0.50       | 7.25      | 167        | 0.00       | 0.00        | 0           | 0.01      | 0.0033   | 1        | 4.4        | 5.8        |
| 3.21                   | At Woodland Drive                                   | 62.8       | 15.2      | 1.0540     | 0.55       | 7.22      | 182        | 0.00       | 0.00        | 0           | 0.2       | 0.067    | 0        | 0          | 4.4        |
| 3.45                   | At Fieldstone Circle                                | 64         | 15.5      | 1.0920     | 0.57       | 7.23      | 193        | 0.00       | 0.00        | 0           | 0.16      | 0.053    | 1        | 4.4        | 4.8        |
| <b>FRENCH DITCH</b>    |                                                     | <b>TEM</b> | <b>DO</b> | <b>SPC</b> | <b>SAL</b> | <b>pH</b> | <b>ORP</b> | <b>NH3</b> | <b>F-CI</b> | <b>T-CI</b> | <b>PO</b> | <b>P</b> | <b>N</b> | <b>NO3</b> | <b>TBD</b> |
| RM                     | Location                                            | (°F)       | (mg/L)    | (mS/cm)    | (ppt)      |           |            | (mg/L)     | (mg/L)      | (mg/L)      | (mg/L)    | (mg/L)   | (mg/L)   | (mg/L)     | (ntu)      |
| 0.5                    | At Bainbridge Road                                  | 59.1       | 7.54      | 1.1090     | 0.58       | 6.93      | 201        | 0.00       | 0.00        | 0           | 0         | 0        | 0        | 0          | 5.6        |
| 1.3                    | At Chastnut Ridge Road                              | 58.6       | 9.3       | 1.0470     | 0.55       | 6.91      | 183        | 0.05       | 0.00        | 0           | 0         | 0        | 0        | 0          | 5.3        |
| 1.93                   | At Lorain Road                                      | 58.7       | 7.5       | 1.2740     | 0.67       | 6.86      | 170        | 0.00       | 0.10        | 0           | 0.38      | 0.12     | 1        | 4.4        | 5.8        |
| <b>NAGLE DITCH</b>     |                                                     | <b>TEM</b> | <b>DO</b> | <b>SPC</b> | <b>SAL</b> | <b>pH</b> | <b>ORP</b> | <b>NH3</b> | <b>F-CI</b> | <b>T-CI</b> | <b>PO</b> | <b>P</b> | <b>N</b> | <b>NO3</b> | <b>TBD</b> |
| RM                     | Location                                            | (°F)       | (mg/L)    | (mS/cm)    | (ppt)      |           |            | (mg/L)     | (mg/L)      | (mg/L)      | (mg/L)    | (mg/L)   | (mg/L)   | (mg/L)     | (ntu)      |
| 0.37                   | At Boulder Drive                                    | 59.3       | 5.6       | 1.5260     | 0.81       | 6.89      | 181        | 0.00       | 0.15        | 0.15        | 0.28      | 0.093    | 1        | 4.4        | 7.1        |

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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*2.2.3 Priority Areas*

During the course of the site investigation, several stream reaches were identified as impaired. These areas were therefore determined to have the greatest potential as well as need for restoration. Section 2.2.3.1 summarizes the stretches of the main stem of French Creek considered to be the most severely impaired. Section 2.2.3.2 lists and describes the four French Creek tributaries considered to be the most severely impaired.

*2.2.3.1 French Creek Priority Areas* – Two sections of French Creek stood out as the most severely impaired sections during the course of the study. These sections included the stretches from Riegelsberger Road to Mills Road (RMs 9.0 – 10.4) and Mills Road to Center Ridge Road (RMs 10.4 – 12.4).

The impairments noted within the stretch from Riegelsberger Road to Mills Road stem from a rapid expansion of residential development in the community of Avon, including numerous subdivisions and condominium developments. This stretch of the creek also flows through a golf course. The primary impairments noted in this area include a significant lack of riparian buffers, heavy streambank erosion, channel modifications, poor riffle/pool development, and severe overland runoff from adjacent developments and the golf course. Photograph 1 below depicts a view of French creek typical of this stretch. Recommended restoration measures for this stretch of French Creek are outlined in Section 3.1.8.



Photograph 1: French Creek at RM 10.4 (Mills Road).

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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The stream stretch from Mills Road to Center Ridge Road is undergoing similar development pressure to that described above, causing the same concerns. However, this stretch of the creek is additionally impacted by commercial/industrial/municipal development with a series of associated discharges from various culverts and PVC drains from adjacent properties on either side of the creek. These discharges are evidently the cause of a rust-colored sheen in the water column near the upstream portion of this stretch of the creek closest to Center Ridge Road. Photograph 2 below depicts this rust colored discharge. Recommended restoration measures for this stretch of French Creek are outlined in Section 3.1.9.



*Photograph 2: Rust-colored discharge noted near RM 12.4 (Center Ridge Road).*

**2.2.3.2 Tributary Priority Areas** - Four tributaries to French Creek were determined to be the most severely impaired during the course of the investigations. These tributaries include Schwartz Ditch, Mills Creek, French Ditch and Kline Ditch.

Schwartz Ditch offers examples of some of the most severe impairment in the French Creek watershed. An expansion of residential subdivisions is incurring dramatic impacts to the creek. Impairments include total removal of riparian buffer zones, heavy sedimentation caused by lack of erosion control on construction sites, and channel modification. Photograph 3 depicts some of the construction impacts that were noted along Schwartz Ditch. Section 3.2.6 outlines recommended restoration measures for Schwartz Ditch.

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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*Photograph 3: Construction impacts along Schwartz Ditch.*

Downstream stretches of Mills Creek have similar impairments to those listed for Schwartz Ditch. Portions have been so impaired that the creek channel is no longer present. Retention ponds have been built within the former channel, portions have been re-routed, culverted and re-shaped. Photograph 4 depicts some of these impacts. Upstream impairments in Mills Creek include a lack of riparian buffer zones and channel modifications (primarily for bank stabilization). Section 3.2.7 outlines recommended restoration measures for Mills Creek.



*Photograph 4: Detention Basin/Ponding within Mills Creek.*

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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Primary impairments noted within French Ditch include a general lack of riparian buffer zones and possible contamination of petroleum products from adjacent commercial/industrial facilities located in the upstream portion of the ditch. Section 3.2.8 includes recommendations for restoration within French Ditch.

The primary impairments identified within Kline Ditch include significant channelization through/around residential developments, and an associated lack of riparian buffers. Several portions of the ditch flow adjacent to active agricultural fields with little buffer area, increasing the potential for agricultural runoff. Sites investigated in the upstream portions of the ditch exhibited signs of possible contamination from failing HSDS's. These portions of the ditch had little flow and the exposed substrate had a blackish staining. Several PVC discharge pipes and some isolated contaminant pools were also noted. Photograph 5 depicts one of these contaminant pools. Section 3.2.4 includes recommendations for restoration within Kline Ditch.



*Photograph 5: Black contaminant pool located along Kline Ditch.*

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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### **3.0 RECOMMENDATIONS**

#### **3.1 French Creek – Main Stem**

*3.1.1 Mouth of Creek to East River Road (RMs 0.0 - 0.54)* – The main concerns in the extreme downstream portion of this stretch (mouth to RM 0.3) are stagnant, low-gradient flow and occasional backflow from the Black River, as well as abandoned automobiles and automobile parts on the creek bank. Recommendations for improvement include removal of automobiles and debris along the banks. Due to the strong influence of the creek from past dredging and backflow from the Black River, there are few easily employable recommendations to improve past modifications. The only concern noted along RMs 0.3 - 0.54 is the moderate bank erosion that is currently occurring. Recommendations to improve this stretch include the implementation of bioengineering protection along the most erosive portions of the creek.

*3.1.2 East River Road to Abbe Road (RMs 0.54 - 3.2)* – This stretch of French Creek is located primarily within the French Creek Reservation. Buffers and riffle/pool development are generally of good quality and would not require any restoration practices. A possible project within this stretch would be to build deflectors to tighten up the channel width and re-alluviate the stretch, which is currently bedrock controlled, creating a wider, shallower creek channel. A secondary recommendation is to ensure detention ponds are built in association with new developments upstream to minimize the increase in water flow.

*3.1.3 Abbe Road to I-90 (RMs 3.2 - 4.5)* – The main concern in the downstream portion of this stretch is the low sinuosity and presence of debris and household garbage (appliances, etc.) on the banks. Recommendations for improvement in this area include the removal of debris and garbage as well as the installation of deflectors to increase sinuosity. The upstream portion of this stretch has several impairments with potential for corrective measures. Concerns include narrow riparian buffers, low sinuosity in the area immediately upstream of I-90 and heavy erosion from a fly ash dump associated with construction on the north side of the creek to the northwest of I-90. Recommendations in this area include increasing the wooded riparian buffer, construction of deflectors to increase sinuosity and enforcement of National/State Pollutant Discharge Elimination System (N/SPDES) regulations (i.e. installation of silt fences and filtration strips between construction areas and creek).

*3.1.4 I-90 to Detroit Road (RMs 4.5 - 6.1)* – The main concerns along this stretch of French Creek include narrow buffers and possible contamination from businesses along Colorado Avenue. Since this stretch is in a medium-density residential and commercial area, opportunities for improved riparian buffers are few, but recommended where possible. Enforcement of the existing discharge regulations is strongly encouraged to minimize impacts of contaminated runoff from adjacent structures.

*3.1.5 Detroit Road to Stony Ridge Road (RMs 6.1 - 6.9)* – This stretch of the creek flows through medium-density residential development. As with most suburban areas, a significant concern is the lack of a significant riparian buffer. Discharges from backyard drainages were also noted. Although there may be limited opportunity to increase buffer zones in this stretch, it is recommended where feasible. In addition, reduction of contamination from backyard drainage

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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is recommended. Possible solutions may include the implementation of filter strips or first flush basins.

*3.1.6 Stony Ridge Road to Center Road (RMs 6.9 - 7.65)* – The main concerns in this stretch of the creek are low velocity, low sinuosity flow as well as apparent contamination from failing septic systems. Recommendations for improvement include the construction of deflectors and other structures to improve sinuosity and riffle/pool development as well as inspection and enforcement of local health codes with regard to the functionality of nearby septic systems.

*3.1.7 Center Road to Riegelsberger Road (RMs 7.65 - 8.9)* – The primary impairments noted in this stretch of the creek include minimal riparian buffers and sediment runoff from agricultural areas and new residential developments. Recommendations include expansion of riparian buffer zones, implementation of agricultural Best Management Practices (BMPs) and enforcement of N/SPDES regulations (i.e. installation of siltation ponds and silt fencing). In addition, nitrification from agricultural operations (i.e. fecal matter from animal operations) appeared to create water quality problems. A recommendation is to work with the individual owners of these operations, possibly through the Lorain County Soil and Water Conservation District to correct these issues.

*3.1.8 Riegelsberger Road to Mills Road (RMs 8.9 - 10.4)* – Concerns abound in this stretch of the creek which stem from a rapid expansion of residential development in the area, including numerous subdivisions and condominium developments. These concerns include a lack of riparian buffers, heavy erosion, channel modification, little riffle/pool development, and runoff from adjacent development. Great opportunities for restoration include, where feasible, development of riparian buffer strips, construction of deflectors to improve riffle/pool development, enforcement of N/SPDES regulations (i.e. installation of silt fencing and siltation ponds) to reduce sedimentation, and protection of those riparian buffers and natural stream segments that still exist.

*3.1.9 Mills Road to Center Ridge Road (RMs 10.4 - 12.4)* – This stretch of the creek is undergoing similar development pressure as listed in Section 3.1.8, causing similar concerns. In addition, the upstream portion of this stretch (closest to Center Ridge Road) is bordered by commercial/industrial/municipal development with a series of associated discharges from various culverts and PVC drains from adjacent properties on either side of the creek, causing a rust-colored sheen in the creek. Recommendations for improvement, in addition to those recommended in Section 3.1.8, include investigation of the discharges and enforcement of existing regulations.

*3.1.10 Center Ridge Road to Lear-Nagle Road (RMs 12.4 - 14.1)* – The main concerns noted in this stretch of stream include narrow riparian buffers adjacent to residential and commercial development as well as various discharges from adjacent properties. Since opportunities for the expansion of the buffer zone are generally minimal, restoration should be focused on the preservation and enhancement of the buffer zone that remains. In addition, enforcement of existing codes and regulations regarding discharges are recommended.

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

---

*3.1.11 Lear-Nagle Road to Cuyahoga County line (RMs 14.1 - end)* – This stretch of the creek mainly flows through developed residential areas. Primary concerns include the lack of riparian buffers and runoff from lawns. Recommendations include buffer zone expansion, where feasible, and preservation of the remaining buffer zone.

### 3.2 TRIBUTARIES

*3.2.1 Quarry Ditch* – The primary concern within this ditch is an unculverted road crossing which impounds the ditch. Other concerns include narrow riparian buffers and the presence of invasive species (purple loosestrife and common reed) in an old quarry which forms the headwaters for the ditch. Recommendations include the installation of a culvert and water control structure at the road crossing, the development of a larger riparian buffer and invasive species control.

*3.2.2 Jungbluth Ditch* – Most of the impairments associated with this ditch are located in the upstream stretches. Concerns include channelization for residential developments, and the lack of riparian buffers associated with residential development. Although opportunities for restoration are minimal due to existing development, recommendations include installation of deflectors to improve sinuosity and expansion and enhancement of riparian buffers.

*3.2.3 Walker Ditch* – The lower reaches of Walker Ditch are located within French Creek Reservation Park and are generally healthy and functional. Upstream of the park, impairments include channel modifications due to residential expansion, lack of riparian buffers, and runoff from residential areas. Although opportunities for enhancement may be limited due to the proximity of existing development, creation of riparian buffers is recommended where feasible. Preservation of existing buffers should also be a priority.

*3.2.4 Kline Ditch* – Lack of riparian buffers and channel modification are concerns along the entire length of Kline Ditch. In the upstream portions, runoff from agricultural fields contributes to bedload concerns. Upstream of Detroit Road, it appears that the ditch has been contaminated with effluent from failing septic systems. Recommendations include expansion and preservation of riparian buffer zones. Installation of deflectors is recommended to correct channel modifications. Inspection of septic systems and enforcement of health codes is strongly recommended in order to reduce the influx of effluent into the ditch.

*3.2.5 Avins Ditch* – Although Avins Ditch is highly impaired for most of its length, opportunities for restoration are limited due to the industrial nature of the area. The downstream stretch near the confluence with French Creek consists of a concrete channel with riprap on the banks. Upstream, lawns adjacent to industrial development minimize the riparian buffer. It appears the upstream portions are intermittently dredged or are culverted. Where feasible, enhancement and/or creation of riparian buffers are recommended.

*3.2.6 Schwartz Ditch* – Schwartz Ditch offers examples of some of the most severe impairment in the French Creek watershed. A rapid expansion of residential subdivisions is having dramatic impacts to the creek. Impairments include total removal of riparian buffer zones, heavy sedimentation caused by lack of erosion control on construction sites and channel modification.

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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Recommendations include enforcement of N/SPDES regulations (i.e. installation of silt fences, etc.). Preservation of remaining riparian buffer zones is imperative and creation/enhancement of buffer zones in other areas is strongly recommended. Installation of deflectors is additionally recommended to restore sinuosity.

*3.2.7 Mills Creek* – Downstream stretches of Mills Creek have similar impairments to those listed in Section 3.2.6 in Schwartz Ditch. Portions of the creek have been so impaired that the creek channel is no longer present. Retention ponds have been built within the former channel, portions have been re-routed, culverted and re-shaped. Upstream, impairments include lack of riparian buffer zones and channel stabilization. Recommendations include enforcement of N/SPDES regulations (i.e. installation of silt fences, etc.), preservation of remaining riparian buffer zones, creation/enhancement of buffer zones and installation of deflectors to restore sinuosity.

*3.2.8 French Ditch* – Concerns with French Ditch include a lack of riparian buffer zones and possible contamination from petroleum products (parking lot runoff). Recommendations include preservation of existing riparian buffer zones and creation/enhancement of buffer zones. The contamination in the upstream portion should be investigated and rectified, if necessary.

*3.2.9 Nagle Ditch* – Nagle ditch flows primarily through residential developments. The primary concerns noted in Nagle Ditch include channel modifications (improper culvert installation), lack of riparian buffers, and the presence of an unidentified contaminant derived from a discharge pipe, similar to that noted in French Creek near Center Ridge Road. It is recommended that the culvert be investigated and possibly re-installed and that the contamination source be investigated and rectified, if necessary.

### 3.3 Watershed-wide Recommendations

Several measures can be taken to encourage an improvement in the habitat and water quality of French Creek and its tributaries, as follows:

- Improved enforcement of existing State and local sediment control regulations. Many construction sites encountered during the French Creek study did not appear to be in compliance. Silt fences were not used regularly where required along stream channels, etc. Local municipalities need to be educated on the regulations and held responsible for compliance.
- Improved enforcement of existing Federal and State Section 404 and 401 regulations. Suggest that municipalities be educated and held responsible for ensuring that compliance with these laws is adhered to prior, during, and after the construction of new residential subdivisions, commercial and industrial developments. Several instances of severe impact to stream channels were encountered during the French Creek study, including drastic alterations to the channels themselves, widespread culverting and constructing retention ponds within the former channels.
- Encourage (both voluntarily and with the use of incentives) the development of wooded buffers adjacent to French Creek and its tributaries. The development of buffers improves both habitat and water quality.

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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- Create filtration wetlands in areas where severe erosion is adding to the bedload of the creek and its tributaries. These wetlands serve the dual purpose of improving water quality and limiting flood damage to adjacent structures.
- Enforce local health department regulations in relation to residential septic systems. Various failures of these systems were noted during the French Creek study. Coordination with the Health Department and OEPA is encouraged to rectify the discharge of raw sewage into the creeks. Opportunities for conducting future projects designed to correct these problems may exist with the USACE through the Ohio Environmental Infrastructure authority (Section 594).
- Construct bioengineering erosion control projects where severe erosion is occurring along stream banks.
- Curtail discharge of stormwater runoff from urban areas directly into French Creek and its tributaries. Encourage the development and use of storm water detention basins (not retention basins).

#### **4.0 CONCLUSIONS**

In conclusion, several and varied impairments have been identified in the French Creek sub-watershed through the course of this study. However, most of these impairments can be attributed to the massive expansion of development (both residential and commercial) currently ongoing in the watershed. The extensive development has contributed to a general lack of natural riparian buffer zones, increased runoff from both impervious surfaces such as roads, driveways and parking lots, as well as from maintained lawn surfaces, all of which contribute to unnaturally flashy storm flows which create erosion problems and transport large amounts of sediment from the stream bed. Several portions of the watershed were likewise identified as being impacted by point discharges from storm drains, home drainage, and possible HSDS discharges which contribute to this effect as well. Although one of the goals of this study was to identify an unknown source of toxicity which has contributed to recent fish kills, no single source was readily apparent through site surveys and water quality testing. Instead it is presumed that the source of this toxicity is derived from all of the impairments described in this report combining to decrease DO levels to lethal levels at certain times of the year.

Although individual site-specific restoration activities may not have an immediate dramatic impact on the overall health of the Black River watershed or French Creek sub-watershed, a programmatic approach to restoration and watershed management will, overtime, vastly improve the health of the watershed. Initially, it is recommended that restoration measures be concentrated, as was described in Section 3.0 of this report, at educating local officials and the public on the adverse effects development may have on the watershed, and more importantly, on the concepts of environmentally responsible future development (including enforcement of existing regulations), in conjunction with select site-specific restoration.

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**APPENDIX A:  
QHEI MATRIX TABLE**

| Waterbody Name   | River Mile | QHEI Score | Gradient (ft/mi) | WWH ATTRIBUTES                 |                                 |                      |                           |                            |                          |                     |                         | MWH ATTRIBUTES       |                            |                      |               |                 |                               |                                     |                    |                           |                        | TOTAL MODERATE INFLUENCE MWH ATTRIBUTES | MWH HIGH INFLUENCE/MWH RATIO | MWH MODERATE INFLUENCE/MWH RATIO |                          |                       |                  |                      |                             |                 |
|------------------|------------|------------|------------------|--------------------------------|---------------------------------|----------------------|---------------------------|----------------------------|--------------------------|---------------------|-------------------------|----------------------|----------------------------|----------------------|---------------|-----------------|-------------------------------|-------------------------------------|--------------------|---------------------------|------------------------|-----------------------------------------|------------------------------|----------------------------------|--------------------------|-----------------------|------------------|----------------------|-----------------------------|-----------------|
|                  |            |            |                  | No channelization or recovered | Boulder/cobble/gravel substrate | Silt-free substrates | Good/excellent substrates | Moderate to high sinuosity | Extensive/moderate cover | Fast current/eddies | Low/normal embeddedness | TOTAL WWH ATTRIBUTES | High Influence             |                      |               |                 |                               | Moderate Influence                  |                    |                           |                        |                                         |                              |                                  |                          |                       |                  |                      |                             |                 |
|                  |            |            |                  |                                |                                 |                      |                           |                            |                          |                     |                         |                      | Channelized or no recovery | Silt/muck substrates | Low sinuosity | Sparse/no cover | Maximum depth less than 40 cm | TOTAL HIGH INFLUENCE MWH ATTRIBUTES | Recovering channel | Heavy/moderate silt cover | Sand substrates (boat) |                                         |                              |                                  | Hardpan substrate origin | Fair/poor development | Low/no sinuosity | Only 1-2 cover types | Intermittent and poor pools | No fast current |
| French Creek     | 0.1        | 49.25      | 7.9              | X                              |                                 |                      |                           |                            |                          |                     | 1                       | X                    | X                          | X                    |               | 3               |                               | X                                   |                    |                           |                        |                                         |                              |                                  |                          | 6                     | 3.0              | 6.0                  |                             |                 |
|                  | 0.38       | 70         | 7.9              | X                              | X                               |                      |                           |                            |                          |                     | 3                       |                      |                            | X                    |               | 0               |                               | X                                   |                    |                           |                        |                                         |                              |                                  |                          |                       | 6                | 0.3                  | 2.0                         |                 |
|                  | 0.54       | 69.5       | 10.8             | X                              | X                               |                      | X                         | X                          | X                        | X                   | 7                       |                      |                            |                      |               | 0               |                               |                                     |                    |                           |                        |                                         |                              |                                  |                          |                       | 1                | 0.0                  | 0.1                         |                 |
|                  | 1.4        | 74         | 7.4              | X                              | X                               |                      | X                         | X                          | X                        | X                   | 7                       |                      |                            |                      |               | 0               |                               |                                     |                    |                           |                        |                                         |                              |                                  |                          |                       | 1                | 0.0                  | 0.1                         |                 |
|                  | 3.2        | 69.5       | 6.8              | X                              | X                               |                      | X                         | X                          | X                        | X                   | 7                       |                      |                            | X                    |               | 1               |                               |                                     | X                  | X                         |                        |                                         |                              |                                  |                          |                       | 4                | 0.2                  | 0.8                         |                 |
|                  | 4.0        | 64.5       | 6.7              | X                              | X                               |                      | X                         | X                          |                          |                     | 5                       |                      |                            |                      |               | 0               |                               | X                                   | X                  |                           |                        |                                         |                              |                                  |                          |                       | 5                | 0.0                  | 1.0                         |                 |
|                  | 4.5        | 43.5       | 8.1              | X                              |                                 |                      |                           |                            |                          |                     | 1                       |                      | X                          | X                    | X             | 3               |                               | X                                   | X                  |                           | X                      | X                                       |                              | X                                | X                        | X                     | 8                | 3.0                  | 8.0                         |                 |
|                  | 5.5        | 61.75      | 31.6             | X                              | X                               |                      | X                         | X                          | X                        | X                   | 6                       |                      |                            |                      | X             | 1               |                               |                                     |                    |                           |                        |                                         |                              |                                  |                          |                       | 1                | 0.2                  | 0.2                         |                 |
|                  | 6.1        | 59         | 11.6             | X                              | X                               |                      | X                         | X                          |                          |                     | 4                       |                      |                            | X                    |               | 1               |                               | X                                   | X                  |                           | X                      | X                                       | X                            |                                  |                          |                       | 6                | 0.3                  | 1.5                         |                 |
|                  | 6.9        | 69.25      | 16.1             | X                              | X                               |                      | X                         | X                          | X                        |                     | 6                       |                      |                            |                      |               | 0               |                               |                                     |                    | X                         |                        |                                         |                              |                                  |                          |                       | 2                | 0.0                  | 0.3                         |                 |
|                  | 7.65       | 45.5       | 3.9              |                                |                                 |                      |                           | X                          |                          |                     | 1                       | X                    |                            | X                    |               | 2               |                               | X                                   | X                  | X                         | X                      | X                                       | X                            | X                                | X                        |                       | 9                | 2.0                  | 9.0                         |                 |
|                  | 8.9        | 42         | 5.8              |                                | X                               |                      |                           | X                          |                          |                     | 2                       |                      |                            | X                    |               | 1               | X                             | X                                   | X                  | X                         | X                      | X                                       | X                            | X                                | X                        |                       | 9                | 5.0                  | 4.5                         |                 |
|                  | 10.4       | 27         | 7.6              |                                |                                 |                      |                           |                            |                          |                     | 0                       | X                    | X                          | X                    | X             | 5               |                               | X                                   | X                  | X                         | X                      | X                                       | X                            | X                                | X                        |                       | 9                | 5.0                  | 9.0                         |                 |
|                  | 10.7       | 40         | 8.5              |                                | X                               |                      |                           |                            |                          |                     | 1                       | X                    | X                          | X                    | X             | 5               |                               | X                                   | X                  | X                         | X                      | X                                       | X                            | X                                | X                        |                       | 9                | 5.0                  | 9.0                         |                 |
|                  | 12.4       | 45.5       | 9.3              |                                |                                 |                      |                           | X                          |                          |                     | 1                       |                      | X                          | X                    |               | 2               | X                             | X                                   | X                  | X                         | X                      |                                         |                              |                                  |                          |                       | 8                | 2.0                  | 8.0                         |                 |
|                  | 12.7       | 45         | 6.3              |                                |                                 |                      |                           | X                          |                          |                     | 1                       |                      | X                          | X                    |               | 2               | X                             | X                                   | X                  | X                         | X                      |                                         |                              |                                  |                          |                       | 8                | 2.0                  | 8.0                         |                 |
|                  | 14.1       | 34         | 6.1              |                                | X                               |                      |                           |                            |                          |                     | 1                       |                      |                            | X                    | X             | 3               | X                             | X                                   | X                  | X                         | X                      | X                                       | X                            | X                                | X                        |                       | 10               | 3.0                  | 10.0                        |                 |
| "Quarry" Ditch   | 0.0        | 50         | 20.0             |                                | X                               |                      |                           | X                          |                          |                     | 2                       |                      | X                          | X                    | X             | 3               | X                             | X                                   |                    | X                         | X                      |                                         |                              |                                  |                          |                       | 7                | 1.5                  | 3.5                         |                 |
| Jungbluth Ditch  | 0.0        | 58.5       | 30.8             |                                | X                               |                      |                           | X                          | X                        |                     | 3                       |                      |                            | X                    |               | 2               | X                             |                                     | X                  | X                         |                        |                                         |                              |                                  |                          |                       | 5                | 0.7                  | 1.7                         |                 |
|                  | 1.0        | 65         | 22.2             | X                              |                                 |                      |                           | X                          | X                        | X                   | 4                       |                      |                            |                      |               | 0               |                               | X                                   |                    |                           |                        |                                         |                              |                                  |                          |                       | 2                | 0.0                  | 0.5                         |                 |
|                  | 1.6        | 35.5       | 9.4              |                                | X                               |                      |                           |                            |                          |                     | 1                       |                      | X                          | X                    | X             | 3               | X                             | X                                   |                    | X                         | X                      |                                         | X                            | X                                | X                        |                       | 7                | 3.0                  | 7.0                         |                 |
|                  | 3.15       | 59         | 28.6             |                                | X                               |                      | X                         |                            | X                        | X                   | 4                       |                      |                            | X                    |               | 1               | X                             |                                     |                    | X                         | X                      |                                         | X                            |                                  |                          |                       | 4                | 0.3                  | 1.0                         |                 |
|                  | 4.13       | 46.5       | 25.0             |                                |                                 |                      |                           | X                          | X                        | X                   | 2                       |                      | X                          | X                    | X             | 3               | X                             |                                     |                    | X                         | X                      | X                                       | X                            |                                  |                          |                       | 5                | 1.5                  | 2.5                         |                 |
| Walker Ditch     | 0.0        | 66.5       | 30.3             | X                              | X                               | X                    | X                         | X                          | X                        | X                   | 6                       |                      |                            | X                    | X             | 2               |                               |                                     | X                  | X                         |                        |                                         |                              |                                  |                          |                       | 3                | 0.3                  | 0.5                         |                 |
|                  | 0.6        | 67         | 18.5             | X                              | X                               |                      | X                         | X                          | X                        | X                   | 6                       |                      |                            |                      | X             | 1               |                               |                                     | X                  |                           |                        |                                         |                              |                                  |                          |                       | 3                | 0.2                  | 0.5                         |                 |
|                  | 1.7        | 23         | 6.3              |                                |                                 |                      |                           |                            |                          |                     | 0                       | X                    | X                          | X                    | X             | 5               |                               | X                                   |                    | X                         | X                      | X                                       | X                            | X                                | X                        |                       | 8                | 5.0                  | 8.0                         |                 |
|                  | 2.2        | 23.5       | 8.3              |                                |                                 |                      |                           |                            |                          |                     | 0                       | X                    | X                          | X                    | X             | 5               |                               | X                                   |                    | X                         | X                      | X                                       | X                            | X                                | X                        | X                     |                  | 9                    | 5.0                         | 9.0             |
|                  | 3.3        | 31.5       | 17.4             |                                |                                 |                      |                           |                            |                          |                     | 0                       |                      | X                          | X                    | X             | 4               | X                             | X                                   | X                  | X                         | X                      |                                         | X                            | X                                | X                        |                       | 8                | 4.0                  | 8.0                         |                 |
|                  | 3.45       | 29.5       | 17.4             |                                |                                 |                      |                           |                            |                          |                     | 0                       | X                    | X                          | X                    | X             | 5               |                               | X                                   | X                  | X                         | X                      |                                         | X                            | X                                | X                        | X                     |                  | 9                    | 5.0                         | 9.0             |
| Kline Ditch      | 0.0        | 65         | 17.4             | X                              | X                               | X                    | X                         |                            | X                        |                     | 6                       |                      |                            | X                    |               | 2               |                               |                                     | X                  | X                         |                        |                                         |                              |                                  |                          |                       | 3                | 0.3                  | 0.5                         |                 |
|                  | 1.22       | 32.75      | 12.7             |                                |                                 |                      |                           |                            |                          |                     | 0                       |                      | X                          | X                    | X             | 4               | X                             | X                                   |                    | X                         | X                      |                                         |                              |                                  |                          |                       | 8                | 4.0                  | 8.0                         |                 |
|                  | 2.15       | 51.5       | 16.7             | X                              | X                               |                      | X                         | X                          | X                        |                     | 5                       |                      |                            |                      | X             | 1               |                               | X                                   |                    | X                         |                        | X                                       | X                            | X                                | X                        |                       | 7                | 0.2                  | 1.4                         |                 |
| "Schwartz" Ditch | 0.0        | 29         | 10.0             |                                |                                 |                      |                           | X                          |                          |                     | 1                       | X                    | X                          | X                    |               | 3               |                               | X                                   |                    | X                         | X                      |                                         | X                            | X                                | X                        |                       | 7                | 3.0                  | 7.0                         |                 |
|                  | 0.3        | 35         | 3.7              |                                |                                 |                      |                           | X                          |                          |                     | 1                       |                      | X                          | X                    | X             | 3               | X                             | X                                   |                    | X                         | X                      | X                                       |                              |                                  |                          |                       | 8                | 3.0                  | 8.0                         |                 |
|                  | 0.52       | 40.5       | 3.7              |                                |                                 |                      |                           | X                          |                          |                     | 1                       |                      | X                          | X                    | X             | 2               | X                             | X                                   |                    | X                         | X                      | X                                       |                              | X                                | X                        | X                     | 9                | 2.0                  | 9.0                         |                 |
|                  | 0.71       | 21.5       | 3.7              |                                |                                 |                      |                           | X                          |                          |                     | 1                       | X                    | X                          | X                    | X             | 4               |                               | X                                   |                    | X                         | X                      | X                                       |                              | X                                | X                        | X                     | 7                | 4.0                  | 7.0                         |                 |
| Mills Creek      | 0.22       | 31.5       | 19.6             |                                | X                               |                      |                           |                            |                          |                     | 1                       | X                    |                            | X                    | X             | 4               |                               | X                                   |                    | X                         | X                      | X                                       | X                            | X                                | X                        | X                     | 10               | 4.0                  | 10.0                        |                 |
|                  | 1.32       | 45.5       | 6.1              |                                | X                               |                      |                           |                            |                          |                     | 1                       |                      |                            | X                    | X             | 3               | X                             | X                                   |                    | X                         | X                      | X                                       |                              |                                  |                          |                       | 8                | 3.0                  | 8.0                         |                 |
|                  | 1.55       | 51.5       | 6.4              |                                | X                               |                      |                           |                            | X                        |                     | 2                       |                      |                            | X                    | X             | 2               | X                             | X                                   | X                  | X                         | X                      |                                         | X                            |                                  |                          |                       | 6                | 1.0                  | 3.0                         |                 |
|                  | 2.5        | 52.75      | 8.8              | X                              | X                               |                      | X                         |                            |                          |                     | 3                       |                      |                            | X                    | X             | 3               |                               | X                                   |                    | X                         | X                      |                                         | X                            | X                                | X                        |                       | 6                | 1.0                  | 2.0                         |                 |
|                  | 2.7        | 63         | 15.9             | X                              | X                               |                      | X                         |                            | X                        |                     | 5                       |                      |                            | X                    |               | 2               |                               |                                     |                    | X                         |                        |                                         |                              |                                  |                          |                       | 2                | 0.4                  | 0.4                         |                 |
|                  | 3.21       | 41         | 7.6              | X                              | X                               |                      |                           | X                          | X                        |                     | 4                       |                      |                            | X                    |               | 2               |                               |                                     | X                  | X                         | X                      |                                         | X                            |                                  |                          |                       | 4                | 0.5                  | 1.0                         |                 |
|                  | 3.45       | 46.5       | 7.6              | X                              | X                               |                      | X                         |                            | X                        |                     | 4                       |                      |                            | X                    | X             | 3               |                               |                                     | X                  | X                         | X                      |                                         | X                            |                                  |                          |                       | 4                | 0.8                  | 1.0                         |                 |
| "French" Ditch   | 0.0        | 50.75      | 14.7             | X                              | X                               |                      | X                         |                            | X                        |                     | 5                       |                      |                            | X                    |               | 2               |                               |                                     | X                  | X                         |                        |                                         |                              |                                  |                          |                       | 3                | 0.4                  | 0.6                         |                 |
|                  | 0.5        | 40.75      | 13.2             |                                | X                               |                      |                           | X                          |                          |                     | 2                       |                      |                            | X                    |               | 2               | X                             | X                                   | X                  | X                         | X                      |                                         | X                            | X                                | X                        |                       | 8                | 1.0                  | 4.0                         |                 |
|                  | 1.3        | 32.5       | 12.5             |                                | X                               |                      |                           |                            |                          |                     | 1                       | X                    |                            | X                    | X             | 4               |                               | X                                   | X                  | X                         | X                      | X                                       |                              | X                                | X                        | X                     | 8                | 4.0                  | 8.0                         |                 |
|                  | 1.93       | 57.25      | 11.5             | X                              | X                               |                      |                           | X                          | X                        |                     | 4                       |                      |                            |                      |               | 0               |                               |                                     | X                  | X                         |                        |                                         |                              |                                  |                          |                       | 6                | 0.0                  | 1.5                         |                 |
| "Nagle" Ditch    | 0.37       | 34         | 14.3             |                                |                                 |                      |                           |                            |                          |                     | 0                       |                      | X                          | X                    | X             | 3               | X                             | X                                   |                    | X                         | X                      |                                         | X                            | X                                | X                        | X                     | 8                | 3.0                  | 8.0                         |                 |

**APPENDIX B:**

**FIELD NOTES, PHOTOGRAPHS AND DATA SHEETS**

**FRENCH CREEK NOTES**

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 0.1  
Stream Segment Location: Near mouth of creek (at Black River)  
QHEI Score: 49.25

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FIELD NOTES: 19 AUG 2002

Creek is generally low gradient in wide portion near outlet to Black River. Stretch between bridge and wide portion is slow moving. However, deep pools (chest deep) occur. Portion near mouth is fairly uniform (80' wide) and chest to waist deep. Commercial and residential property is within 100 m. of channel on north side, although a 200 +' forested buffer is adjacent. There is a steep 50+/- ' embankment on north side. There is a wider buffer of riparian forest on south side. Dominant species are black walnut, green ash, boxelder and some black willow, cottonwood, and other species, including sycamore. Sources of contaminants are fairly minor, but a tile pipe was noted discharging on the south side of creek; two ditches discharge from the north; several cars and car parts are within and adjacent to the north side of the creek, apparently thrown over the embankment to the north. Also, there may be backflow from the Black River. An intermittent tributary enters the creek from the south.

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PHOTOS:



1) French Creek 0.1- facing SW (downstream) towards Black River



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **49.25**

River Code: RM: 0.1 Stream: FRENCH CREEK

Date: 08-19-02 Location: NEAR BLACK RIVER CONFLUENCE

Scorers Full Name: JAY MILLER Affiliation: U.S. ARMY CORPS OF ENGINEERS - BUFFALO DISTRICT

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

|                                                        |                                                          |                                                     |                                              |                                                     |                                 |
|--------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------|----------------------------------------------|-----------------------------------------------------|---------------------------------|
| TYPE                                                   | POOL RIFFLE                                              | POOL RIFFLE                                         | SUBSTRATE ORIGIN                             | SUBSTRATE QUALITY                                   |                                 |
| <input type="checkbox"/> B-LDR /SLBS [10] _____        | <input checked="" type="checkbox"/> GRAVEL [7] <u>60</u> | Check ONE (OR 2 & AVERAGE)                          | Check ONE (OR 2 & AVERAGE)                   |                                                     |                                 |
| <input type="checkbox"/> BOULDER [9] _____             | <input type="checkbox"/> SAND [6] <u>10</u>              | <input type="checkbox"/> LIMESTONE [1] _____        | SILT:                                        | <input checked="" type="checkbox"/> SILT HEAVY [-2] | Substrate<br><b>6</b><br>Max 20 |
| <input type="checkbox"/> COBBLE [8] _____              | <input type="checkbox"/> BEDROCK [5] _____               | <input checked="" type="checkbox"/> TILLS [1] _____ | <input type="checkbox"/> WETLANDS [0] _____  | <input type="checkbox"/> SILT MODERATE [-1]         |                                 |
| <input type="checkbox"/> HARDPAN [4] _____             | <input type="checkbox"/> DETRITUS [3] _____              | <input type="checkbox"/> HARDPAN [0] _____          | <input type="checkbox"/> SANDSTONE [0] _____ | <input type="checkbox"/> SILT NORMAL [0]            |                                 |
| <input type="checkbox"/> MUCK [2] _____                | <input type="checkbox"/> ARTIFICIAL [0] _____            | <input type="checkbox"/> RIP/RAP [0] _____          | EMBEDDED                                     | <input type="checkbox"/> SILT FREE [1]              |                                 |
| <input checked="" type="checkbox"/> SILT [2] <u>30</u> | NOTE: Ignore Sludge Originating From Point Sources       | NESS:                                               |                                              | <input checked="" type="checkbox"/> EXTENSIVE [-2]  |                                 |
|                                                        |                                                          | <input type="checkbox"/> LACUSTRINE [0] _____       |                                              | <input type="checkbox"/> MODERATE [-1]              |                                 |
|                                                        |                                                          | <input type="checkbox"/> SHALE [-1] _____           |                                              | <input type="checkbox"/> NORMAL [0]                 |                                 |
|                                                        |                                                          | <input type="checkbox"/> COAL FINES [-2] _____      |                                              | <input type="checkbox"/> NONE [1]                   |                                 |

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
(High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS: NO RIFFLE

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

|                                       |                            |                                                 |                    |
|---------------------------------------|----------------------------|-------------------------------------------------|--------------------|
| (Structure)                           | TYPE: Score All That Occur | AMOUNT: (Check ONLY One or check 2 and AVERAGE) | Cover              |
| <u>1</u> UNDERCUT BANKS [1]           | <u>2</u> POOLS > 70 cm [2] | <input type="checkbox"/> EXTENSIVE > 75% [11]   | <b>7</b><br>Max 20 |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <input type="checkbox"/> MODERATE 25-75% [7]    |                    |
| <u>0</u> SHALLOWS (IN SLOW WATER) [1] | <u>0</u> BOULDERS [1]      | <input type="checkbox"/> SPARSE 5-25% [3]       |                    |
| <u>0</u> ROOTMATS [1]                 | COMMENTS: _____            | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |                    |

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

|                                              |                                              |                                                    |                                             |                                                         |                    |
|----------------------------------------------|----------------------------------------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------------------|--------------------|
| SINUOSITY                                    | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY                                   | MODIFICATIONS/OTHER                                     | Channel            |
| <input type="checkbox"/> HIGH [4]            | <input type="checkbox"/> EXCELLENT [7]       | <input checked="" type="checkbox"/> NONE [6]       | <input type="checkbox"/> HIGH [3]           | <input type="checkbox"/> SNAGGING                       | <b>9</b><br>Max 20 |
| <input type="checkbox"/> MODERATE [3]        | <input type="checkbox"/> GOOD [5]            | <input type="checkbox"/> RECOVERED [4]             | <input type="checkbox"/> MODERATE [2]       | <input type="checkbox"/> RELOCATION                     |                    |
| <input type="checkbox"/> LOW [2]             | <input type="checkbox"/> FAIR [3]            | <input type="checkbox"/> RECOVERING [3]            | <input checked="" type="checkbox"/> LOW [1] | <input type="checkbox"/> CANOPY REMOVAL                 |                    |
| <input checked="" type="checkbox"/> NONE [1] | <input checked="" type="checkbox"/> POOR [1] | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                             | <input type="checkbox"/> DREDGING                       |                    |
|                                              |                                              |                                                    |                                             | <input type="checkbox"/> BANK SHAPING                   |                    |
|                                              |                                              |                                                    |                                             | <input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS |                    |

COMMENTS: \_\_\_\_\_

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

|                                                    |                                                           |                                                             |                                                  |                                           |  |                       |
|----------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------|-------------------------------------------|--|-----------------------|
| RIPARIAN WIDTH                                     |                                                           | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)               |                                                  | BANK EROSION                              |  | Riparian              |
| L R (Per Bank)                                     | L R (Most Predominant Per Bank)                           | L R                                                         | L R (Per Bank)                                   |                                           |  | <b>8.25</b><br>Max 10 |
| <input checked="" type="checkbox"/> WIDE > 50m [4] | <input checked="" type="checkbox"/> FOREST, SWAMP [3]     | <input type="checkbox"/> CONSERVATION TILLAGE [1]           | <input type="checkbox"/> NONE/LITTLE [3]         | <input type="checkbox"/> MODERATE [2]     |  |                       |
| <input type="checkbox"/> MODERATE 10-50m [3]       | <input type="checkbox"/> SHRUB OR OLD FIELD [2]           | <input checked="" type="checkbox"/> URBAN OR INDUSTRIAL [0] | <input checked="" type="checkbox"/> MODERATE [2] | <input type="checkbox"/> HEAVY/SEVERE [1] |  |                       |
| <input type="checkbox"/> NARROW 5-10 m [2]         | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0]          | <input type="checkbox"/> HEAVY/SEVERE [1]        |                                           |  |                       |
| <input type="checkbox"/> VERY NARROW < 5 m [1]     | <input type="checkbox"/> FENCED PASTURE [1]               | <input type="checkbox"/> MINING/CONSTRUCTION [0]            |                                                  |                                           |  |                       |
| <input type="checkbox"/> NONE [0]                  |                                                           |                                                             |                                                  |                                           |  |                       |

COMMENTS: \_\_\_\_\_

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

|                                              |                                                                   |                                                              |                    |
|----------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------|--------------------|
| MAX. DEPTH (Check 1 ONLY!)                   | MORPHOLOGY (Check 1 or 2 & AVERAGE)                               | CURRENT VELOCITY ( POOLS & RIFFLES! ) (Check All That Apply) | Pool/Current       |
| <input checked="" type="checkbox"/> > 1m [6] | <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> EDDIES [1]                          | <b>9</b><br>Max 12 |
| <input type="checkbox"/> 0.7-1m [4]          | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> FAST [1]                            |                    |
| <input type="checkbox"/> 0.4-0.7m [2]        | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> MODERATE [1]                        |                    |
| <input type="checkbox"/> 0.2- 0.4m [1]       |                                                                   | <input checked="" type="checkbox"/> SLOW [1]                 |                    |
| <input type="checkbox"/> < 0.2m [POOL=0]     | COMMENTS: _____                                                   | <input type="checkbox"/> VERY FAST [1]                       |                    |

|                                                 |                                       |                                                               |                                         |                     |
|-------------------------------------------------|---------------------------------------|---------------------------------------------------------------|-----------------------------------------|---------------------|
| CHECK ONE OR CHECK 2 AND AVERAGE                |                                       |                                                               |                                         | Riffle/Run          |
| RIFFLE DEPTH                                    | RUN DEPTH                             | RIFFLE/RUN SUBSTRATE                                          | RIFFLE/RUN EMBEDDEDNESS                 | <b>0</b><br>Max 8   |
| <input type="checkbox"/> Best Areas > 10 cm [2] | <input type="checkbox"/> MAX > 50 [2] | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> NONE [2]       |                     |
| <input type="checkbox"/> Best Areas 5-10 cm [1] | <input type="checkbox"/> MAX < 50 [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> LOW [1]        |                     |
| <input type="checkbox"/> Best Areas < 5 cm      |                                       | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> MODERATE [0]   | Gradient            |
| [RIFFLE=0]                                      |                                       |                                                               | <input type="checkbox"/> EXTENSIVE [-1] | <b>10</b><br>Max 10 |

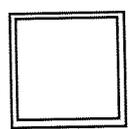
COMMENTS: NO DEFINED RIFFLE AREAS  NO RIFFLE [Metric=0]

6) GRADIENT (ft/mi): 7.9 DRAINAGE AREA (sq.mi.): 42.4 %POOL: — %GLIDE: 100  
%RIFFLE: — %RUN: —

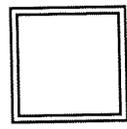
\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_



Subjective Rating (1-10)



Aesthetic Rating (1-10)

Gradient:

- Low,  - Moderate,  - High

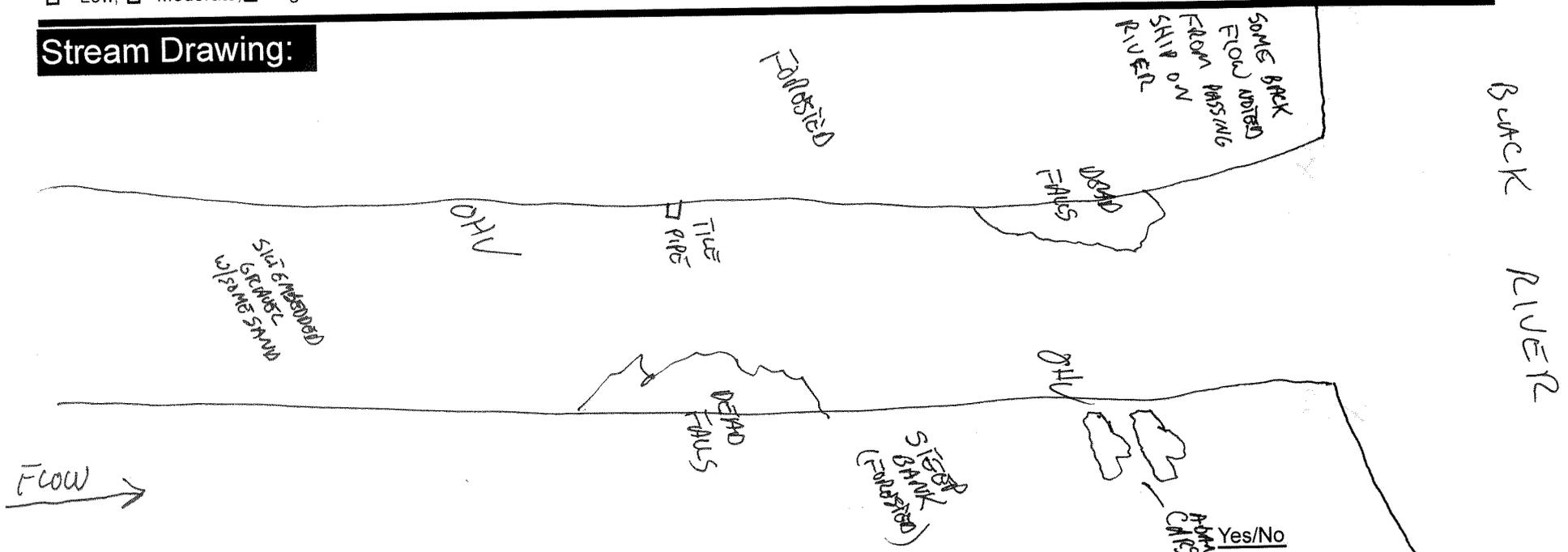
Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Mean Depth | W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Width Ratio |
|---------------|---------------|---------------|--------------------|---------------------|-----------|--------------------|-----------------|-----------------------|
|               |               |               |                    |                     |           |                    |                 |                       |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 0.38  
Stream Segment Location: At mouth of "Quarry" Ditch  
QHEI Score: 70

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FIELD NOTES: 20 AUG 2002

This site is located downstream (west) of the East River Road bridge near the mouth of "Quarry" Ditch. The south bank has a narrow (50') forested buffer with an old field beyond. The north bank has a wide (>100') buffer dominated by upland forest and a riparian wetland later described as Wetland 2. Deep pools (up to 125 cm.) were noted. There is a shale bedrock cut (40' high) which forms the south bank. Moderate erosion is occurring along this stretch of French Creek. The trees in the riparian area are dominated by green ash, eastern cottonwood and boxelder.

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PHOTOS:



2) French Creek 0.38 - Facing NE upstream from downstream end of sampling area point.



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 70

River Code: RM: 0.38 Stream: FRENCH CREEK  
Date: 08-20-02 Location: NAR MOUTH OF "QUARRY DITCH"  
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                     | POOL RIFFLE                                    | POOL RIFFLE                                    | SUBSTRATE ORIGIN                              | SUBSTRATE QUALITY                                                       |
|------------------------------------------|------------------------------------------------|------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------|
| <input type="checkbox"/> BLDR /SLBS [10] | <input checked="" type="checkbox"/> GRAVEL [7] | <u>60</u> <u>70</u>                            | Check ONE (OR 2 & AVERAGE)                    | Check ONE (OR 2 & AVERAGE)                                              |
| <input type="checkbox"/> BOULDER [9]     | <input checked="" type="checkbox"/> SAND [6]   | <u>70</u> <u>15</u>                            | <input type="checkbox"/> LIMESTONE [1]        | <input type="checkbox"/> SILT: <input type="checkbox"/> SILT HEAVY [-2] |
| <input type="checkbox"/> COBBLE [8]      | <u>5</u> <u>5</u>                              | <input type="checkbox"/> BEDROCK [5]           | <input checked="" type="checkbox"/> TILLS [1] | <input checked="" type="checkbox"/> SILT MODERATE [-1]                  |
| <input type="checkbox"/> HARDPAN [4]     | <input type="checkbox"/> DETRITUS [3]          | <input type="checkbox"/> WETLANDS [0]          | <input type="checkbox"/> HARDPAN [0]          | <input type="checkbox"/> SILT NORMAL [0]                                |
| <input type="checkbox"/> MUCK [2]        | <input type="checkbox"/> ARTIFICIAL [0]        | <input type="checkbox"/> SANDSTONE [0]         | EMBEDDED                                      | <input type="checkbox"/> SILT FREE [1]                                  |
| <input type="checkbox"/> SILT [2]        | <u>15</u> <u>10</u>                            | <input type="checkbox"/> RIP/RAP [0]           | NESS:                                         | <input checked="" type="checkbox"/> MODERATE [-1]                       |
|                                          |                                                | <input type="checkbox"/> LACUSTRINE [0]        |                                               | <input type="checkbox"/> NORMAL [0]                                     |
|                                          |                                                | <input checked="" type="checkbox"/> SHALE [-1] |                                               | <input type="checkbox"/> NONE [1]                                       |
|                                          |                                                | <input type="checkbox"/> COAL FINES [-2]       |                                               |                                                                         |

NOTE: Ignore Sludge Originating From Point Sources

Substrate  
13  
Max 20

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
(High Quality Only, Score 5 or >)  3 or Less [0]

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| TYPE                                  | SCORE     | TYPE              | SCORE    | AMOUNT                   |
|---------------------------------------|-----------|-------------------|----------|--------------------------|
| <u>1</u> UNDERCUT BANKS [1]           | <u>2</u>  | POOLS > 70 cm [2] | <u>1</u> | OXBOWS, BACKWATERS [1]   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>1</u>  | ROOTWADS [1]      | <u>0</u> | AQUATIC MACROPHYTES [1]  |
| <u>0</u> SHALLOWS (IN SLOW WATER) [1] | <u>1</u>  | BOULDERS [1]      | <u>2</u> | LOGS OR WOODY DEBRIS [1] |
| <u>0</u> ROOTMATS [1]                 | COMMENTS: |                   |          |                          |

Cover  
10  
Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

| SINUOSITY                                   | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY                                        | MODIFICATIONS/OTHER                                                     |
|---------------------------------------------|----------------------------------------------|----------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|
| <input type="checkbox"/> HIGH [4]           | <input type="checkbox"/> EXCELLENT [7]       | <input checked="" type="checkbox"/> NONE [6]       | <input type="checkbox"/> HIGH [3]                | <input type="checkbox"/> SNAGGING <input type="checkbox"/> IMPOUND.     |
| <input type="checkbox"/> MODERATE [3]       | <input checked="" type="checkbox"/> GOOD [5] | <input type="checkbox"/> RECOVERED [4]             | <input checked="" type="checkbox"/> MODERATE [2] | <input type="checkbox"/> RELOCATION <input type="checkbox"/> ISLANDS    |
| <input checked="" type="checkbox"/> LOW [2] | <input checked="" type="checkbox"/> FAIR [3] | <input type="checkbox"/> RECOVERING [3]            | <input type="checkbox"/> LOW [1]                 | <input type="checkbox"/> CANOPY REMOVAL <input type="checkbox"/> LEVEED |
| <input type="checkbox"/> NONE [1]           | <input type="checkbox"/> POOR [1]            | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                                  | <input type="checkbox"/> DREDGING <input type="checkbox"/> BANK SHAPING |
|                                             |                                              |                                                    |                                                  | <input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS                 |

Channel  
14  
Max 20

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

| RIPARIAN WIDTH                                          | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)              | BANK EROSION                                     |
|---------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------|
| L R (Per Bank)                                          | L R (Most Predominant Per Bank)                            | L R (Per Bank)                                   |
| <input checked="" type="checkbox"/> WIDE > 50m [4]      | <input checked="" type="checkbox"/> FOREST, SWAMP [3]      | <input type="checkbox"/> NONE/LITTLE [3]         |
| <input checked="" type="checkbox"/> MODERATE 10-50m [3] | <input checked="" type="checkbox"/> SHRUB OR OLD FIELD [2] | <input checked="" type="checkbox"/> MODERATE [2] |
| <input type="checkbox"/> NARROW 5-10 m [2]              | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]  | <input type="checkbox"/> HEAVY/SEVERE [1]        |
| <input type="checkbox"/> VERY NARROW <5 m [1]           | <input type="checkbox"/> FENCED PASTURE [1]                | <input type="checkbox"/> MINING/CONSTRUCTION [0] |
| <input type="checkbox"/> NONE [0]                       |                                                            |                                                  |

Riparian  
8  
Max 10

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH                                  | MORPHOLOGY                                                        | CURRENT VELOCITY ( POOLS & RIFFLES! )                                                       |
|---------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| (Check 1 ONLY!)                             | (Check 1 or 2 & AVERAGE)                                          | (Check All That Apply)                                                                      |
| <input checked="" type="checkbox"/> >1m [6] | <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> EDDIES [1] <input type="checkbox"/> TORRENTIAL [-1]                |
| <input type="checkbox"/> 0.7-1m [4]         | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> FAST [1] <input type="checkbox"/> INTERSTITIAL [-1]                |
| <input type="checkbox"/> 0.4-0.7m [2]       | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]               | <input checked="" type="checkbox"/> MODERATE [1] <input type="checkbox"/> INTERMITTENT [-2] |
| <input type="checkbox"/> 0.2-0.4m [1]       |                                                                   | <input checked="" type="checkbox"/> SLOW [1] <input type="checkbox"/> VERY FAST [1]         |
| <input type="checkbox"/> < 0.2m [POOL=0]    | COMMENTS:                                                         |                                                                                             |

Pool/Current  
10  
Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                              | RUN DEPTH                                        | RIFFLE/RUN SUBSTRATE                                                     | RIFFLE/RUN EMBEDDEDNESS                          |
|-----------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------|
| <input checked="" type="checkbox"/> Best Areas >10 cm [2] | <input checked="" type="checkbox"/> MAX > 50 [2] | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]              | <input type="checkbox"/> NONE [2]                |
| <input type="checkbox"/> Best Areas 5-10 cm [1]           | <input type="checkbox"/> MAX < 50 [1]            | <input checked="" type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> LOW [1]                 |
| <input type="checkbox"/> Best Areas < 5 cm [RIFFLE=0]     |                                                  | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]                | <input checked="" type="checkbox"/> MODERATE [0] |
| COMMENTS:                                                 |                                                  | <input type="checkbox"/> NO RIFFLE [Metric=0]                            | <input type="checkbox"/> EXTENSIVE [-1]          |

Riffle/Run  
5  
Max 8

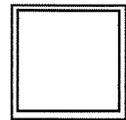
Gradient  
10  
Max 10

6] GRADIENT (ft/mi): 7.9 DRAINAGE AREA (sq.mi.): 42.3  
%POOL: 20 %GLIDE: 40  
%RIFFLE: 10 %RUN: 30

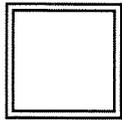
\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_



Subjective Rating (1-10)



Aesthetic Rating (1-10)

Gradient:

- Low,  - Moderate,  - High

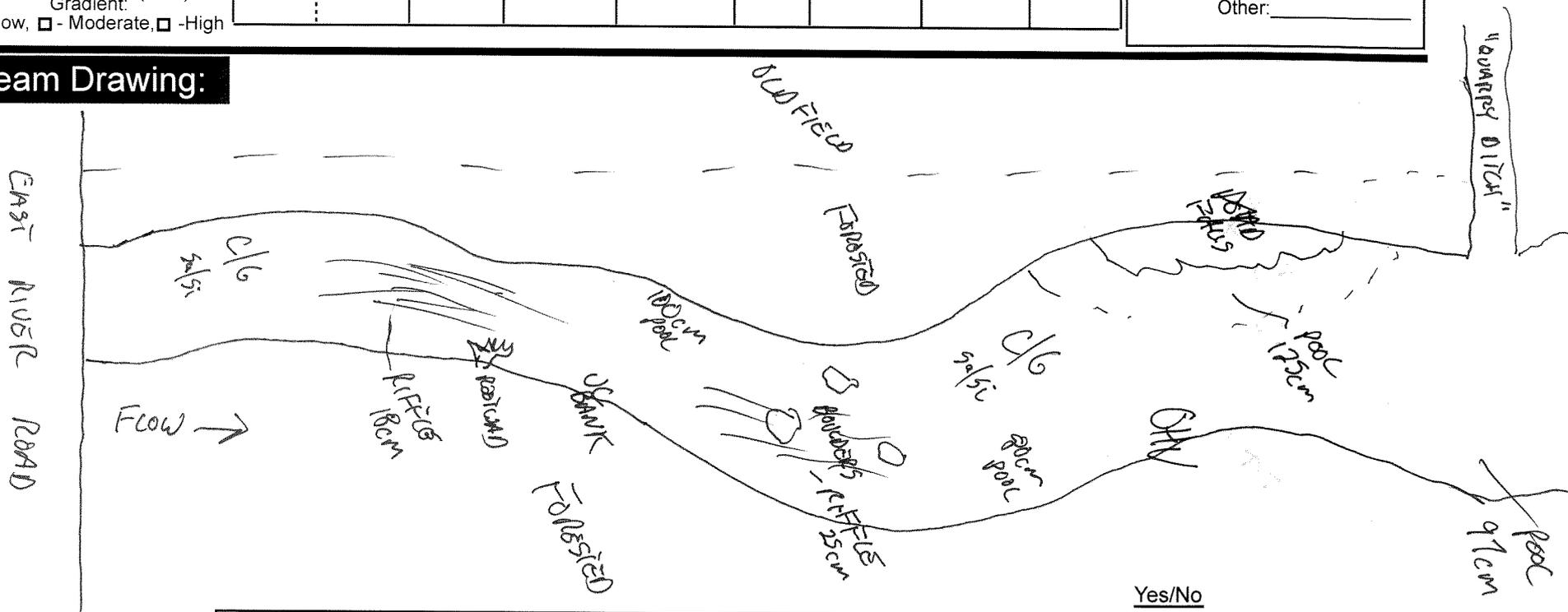
Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Width | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|-----------------|
|               |               |               |                    |                |                |                    |                 |                 |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 0.54  
Stream Segment Location: At East River Road (mouth of Jungbluth Ditch)  
QHEI Score: 69.5

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FIELD NOTES: 20 AUG 2002

This stretch of French Creek is located immediately upstream (east) of the East River Road bridge. Red Cardinal flower (protected) was noted in three locations along this stretch of creek, including in an overflow channel located along the south side of the creek. The wide forested buffer zone is dominated by green ash, eastern cottonwood, boxelder, sycamore, and sugar maple. Some emergent vegetation is located on the fringes of the creek channel and gravel bars within. (rice cutgrass, jewel weed and reed canary grass).

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PHOTOS:

No photo's available.



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

69.5

River Code: RM: 0.54 Stream: FRENCH CREEK

Date: 08-19-07 Location: AT EAST RIVER ROAD

Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present

TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
BLDR /SLBS [10] GRAVEL [7] SAND [6] BEDROCK [5] DETRITUS [3] ARTIFICIAL [0] SANDSTONE [0] RIP/RAP [0] LACUSTRINE [0] COAL FINES [-2]
LIMESTONE [1] SILT: TILLS [1] WETLANDS [0] HARDPAN [0] SANDSTONE [0] RIP/RAP [0] LACUSTRINE [0] SHALE [-1] NONE [1]

Substrate 17 Max 20

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >) 4 or More [2] 3 or Less [0]

COMMENTS: 2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

TYPE: Score All That Occur UNDERCUT BANKS [1] POOLS > 70 cm [2] OXBOWS, BACKWATERS [1] OVERHANGING VEGETATION [1] ROOTWADS [1] AQUATIC MACROPHYTES [1] SHALLOWS (IN SLOW WATER) [1] BOULDERS [1] LOGS OR WOODY DEBRIS [1] ROOTMATS [1] COMMENTS:

Cover 9 Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
HIGH [4] EXCELLENT [7] NONE [6] HIGH [3] SNAGGING IMPOUND.
MODERATE [3] GOOD [5] RECOVERED [4] MODERATE [2] RELOCATION ISLANDS
LOW [2] FAIR [3] RECOVERING [3] LOW [1] CANOPY REMOVAL LEVEED
NONE [1] POOR [1] RECENT OR NO RECOVERY [1] DREDGING BANK SHAPING
ONE SIDE CHANNEL MODIFICATIONS

Channel 14 Max 20

COMMENTS: 4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION
WIDE > 50m [4] FOREST, SWAMP [3] CONSERVATION TILLAGE [1] NONE/LITTLE [3]
MODERATE 10-50m [3] SHRUB OR OLD FIELD [2] URBAN OR INDUSTRIAL [0] MODERATE [2]
NARROW 5-10 m [2] RESIDENTIAL, PARK, NEW FIELD [1] OPEN PASTURE, ROWCROP [0] HEAVY/SEVERE [1]
VERY NARROW <5 m [1] FENCED PASTURE [1] MINING/CONSTRUCTION [0]

Riparian 7.5 Max 10

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH MORPHOLOGY CURRENT VELOCITY POOLS & RIFFLES!
>1m [6] POOL WIDTH > RIFFLE WIDTH [2] EDDIES [1] TORRENTIAL [-1]
0.7-1m [4] POOL WIDTH = RIFFLE WIDTH [1] FAST [1] INTERSTITIAL [-1]
0.4-0.7m [2] POOL WIDTH < RIFFLE W. [0] MODERATE [1] INTERMITTENT [-2]
0.2-0.4m [1] SLOW [1] VERY FAST [1]
< 0.2m [POOL=0] COMMENTS:

Pool/Current 7 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS
Best Areas >10 cm [2] MAX > 50 [2] STABLE (e.g., Cobble, Boulder) [2] NONE [2]
Best Areas 5-10 cm [1] MAX < 50 [1] MOD. STABLE (e.g., Large Gravel) [1] LOW [1]
Best Areas < 5 cm [RIFFLE=0] UNSTABLE (Fine Gravel, Sand) [0] MODERATE [0] EXTENSIVE [-1]
NO RIFFLE [Metric=0]

Riffle/Run 5 Max 8 Gradient 10 Max 10

6) GRADIENT (ft/mi): 10.8 DRAINAGE AREA (sq.mi.): 42 %POOL: 20 %GLIDE: 10 %RIFFLE: 40 %RUN: 30



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 1.4  
Stream Segment Location: At French Creek Reservation Bridge  
QHEI Score: 74

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FIELD NOTES: 20 AUG 2002

This stretch of French Creek is located upstream of the footbridge for the hiking trail in the French Creek Reservation Park. Invertebrates and crayfish were noted. The substrate is dominated by bedrock, with 10% boulders and cobbles, 5% silt and sand, respectively. The generally wide riparian area is dominated by upland forested species including sugar maple, American basswood, eastern cottonwood, sycamore, black cherry, red oak and American beech. Reed canary grass was noted intermittently along the channel fringe. The channel is sinuous and is a good mix of pool/riffle/glide, ranging in width from 35' to 90'.

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PHOTOS:



1) French Creek 1.4 – Facing upstream from the park footbridge



2) French Creek 1.4 – Facing downstream from the park footbridge



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **74**

74

River Code: RM: 14 Stream: FRENCH CREEK  
Date: 08-20-07 Location: NEAR FOOTBRIDGE IN FRENCH CREEK RESERVATION  
Scorers Full Name: JAY MILLER Affiliation: USACE-BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                                    | POOL RIFFLE                                         | POOL RIFFLE                                                        | SUBSTRATE ORIGIN                                | SUBSTRATE QUALITY                                                       |
|---------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------|
| <input type="checkbox"/> BLDR /SLBS [10]                |                                                     | <input checked="" type="checkbox"/> GRAVEL [7] <u>20</u> <u>25</u> | Check ONE (OR 2 & AVERAGE)                      | Check ONE (OR 2 & AVERAGE)                                              |
| <input type="checkbox"/> BOULDER [9] <u>10</u>          | <input type="checkbox"/> SAND [6] <u>5</u> <u>5</u> | <input type="checkbox"/> BEDROCK [5] <u>05</u> <u>40</u>           | <input type="checkbox"/> LIMESTONE [1]          | <input type="checkbox"/> SILT: <input type="checkbox"/> SILT HEAVY [-2] |
| <input type="checkbox"/> COBBLE [8] <u>05</u> <u>15</u> | <input type="checkbox"/> DETRITUS [3]               | <input type="checkbox"/> ARTIFICIAL [0]                            | <input type="checkbox"/> TILLS [1]              | <input type="checkbox"/> SILT MODERATE [-1]                             |
| <input type="checkbox"/> HARDPAN [4]                    | NOTE: Ignore Sludge Originating From Point Sources  | <input type="checkbox"/> SANDSTONE [0]                             | <input type="checkbox"/> WETLANDS [0]           | <input checked="" type="checkbox"/> SILT NORMAL [0]                     |
| <input type="checkbox"/> MUCK [2]                       |                                                     | <input type="checkbox"/> RIP/RAP [0]                               | <input type="checkbox"/> HARDPAN [0]            | <input type="checkbox"/> SILT FREE [1]                                  |
| <input type="checkbox"/> SILT [2] <u>5</u> <u>5</u>     |                                                     | <input type="checkbox"/> LACUSTRINE [0]                            | <input type="checkbox"/> SANDSTONE [0] EMBEDDED | <input type="checkbox"/> EXTENSIVE [-2]                                 |
|                                                         |                                                     | <input checked="" type="checkbox"/> SHALE [-1]                     | NESS:                                           | <input type="checkbox"/> MODERATE [-1]                                  |
|                                                         |                                                     | <input type="checkbox"/> COAL FINES [-2]                           |                                                 | <input checked="" type="checkbox"/> NORMAL [0]                          |
|                                                         |                                                     |                                                                    |                                                 | <input type="checkbox"/> NONE [1]                                       |

Substrate  
**13**  
Max 20

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
(High Quality Only, Score 5 or >)  3 or Less [0]

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)  
TYPE: Score All That Occur

AMOUNT: (Check ONLY One or check 2 and AVERAGE)

|                                       |                            |                                   |
|---------------------------------------|----------------------------|-----------------------------------|
| <u>1</u> UNDERCUT BANKS [1]           | <u>1</u> POOLS > 70 cm [2] | <u>1</u> OXBOWS, BACKWATERS [1]   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <u>0</u> AQUATIC MACROPHYTES [1]  |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>1</u> BOULDERS [1]      | <u>1</u> LOGS OR WOODY DEBRIS [1] |
| <u>0</u> ROOTMATS [1]                 | COMMENTS:                  |                                   |

|                                                 |
|-------------------------------------------------|
| <input type="checkbox"/> EXTENSIVE > 75% [11]   |
| <input type="checkbox"/> MODERATE 25-75% [7]    |
| <input type="checkbox"/> SPARSE 5-25% [3]       |
| <input type="checkbox"/> NEARLY ABSENT < 5% [1] |

Cover  
**9**  
Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

| SINUOSITY                                        | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY                                    | MODIFICATIONS/OTHER                                     |
|--------------------------------------------------|----------------------------------------------|----------------------------------------------------|----------------------------------------------|---------------------------------------------------------|
| <input type="checkbox"/> HIGH [4]                | <input type="checkbox"/> EXCELLENT [7]       | <input checked="" type="checkbox"/> NONE [6]       | <input checked="" type="checkbox"/> HIGH [3] | <input type="checkbox"/> SNAGGING                       |
| <input checked="" type="checkbox"/> MODERATE [3] | <input checked="" type="checkbox"/> GOOD [5] | <input type="checkbox"/> RECOVERED [4]             | <input type="checkbox"/> MODERATE [2]        | <input type="checkbox"/> IMPOUND.                       |
| <input type="checkbox"/> LOW [2]                 | <input type="checkbox"/> FAIR [3]            | <input type="checkbox"/> RECOVERING [3]            | <input type="checkbox"/> LOW [1]             | <input type="checkbox"/> RELOCATION                     |
| <input type="checkbox"/> NONE [1]                | <input type="checkbox"/> POOR [1]            | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                              | <input type="checkbox"/> CANOPY REMOVAL                 |
|                                                  |                                              |                                                    |                                              | <input type="checkbox"/> LEVEED                         |
|                                                  |                                              |                                                    |                                              | <input type="checkbox"/> DREDGING                       |
|                                                  |                                              |                                                    |                                              | <input type="checkbox"/> BANK SHAPING                   |
|                                                  |                                              |                                                    |                                              | <input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS |

Channel  
**17**  
Max 20

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

| RIPARIAN WIDTH                                     |                                                           | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)      |                                                  | BANK EROSION                                     |  |
|----------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--|
| L R (Per Bank)                                     | L R (Most Predominant Per Bank)                           | L R                                                | L R                                              | L R (Per Bank)                                   |  |
| <input checked="" type="checkbox"/> WIDE > 50m [4] | <input checked="" type="checkbox"/> FOREST, SWAMP [3]     | <input type="checkbox"/> CONSERVATION TILLAGE [1]  | <input type="checkbox"/> URBAN OR INDUSTRIAL [0] | <input type="checkbox"/> NONE/LITTLE [3]         |  |
| <input type="checkbox"/> MODERATE 10-50m [3]       | <input type="checkbox"/> SHRUB OR OLD FIELD [2]           | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] | <input type="checkbox"/> MINING/CONSTRUCTION [0] | <input checked="" type="checkbox"/> MODERATE [2] |  |
| <input type="checkbox"/> NARROW 5-10 m [2]         | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] |                                                    |                                                  | <input type="checkbox"/> HEAVY/SEVERE [1]        |  |
| <input type="checkbox"/> VERY NARROW < 5 m [1]     | <input type="checkbox"/> FENCED PASTURE [1]               |                                                    |                                                  |                                                  |  |
| <input type="checkbox"/> NONE [0]                  |                                                           |                                                    |                                                  |                                                  |  |

Riparian  
**9**  
Max 10

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH                                     | MORPHOLOGY                                                        | CURRENT VELOCITY [ POOLS & RIFFLES! ]            |
|------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------|
| (Check 1 ONLY!)                                | (Check 1 or 2 & AVERAGE)                                          | (Check All That Apply)                           |
| <input type="checkbox"/> > 1m [6]              | <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input checked="" type="checkbox"/> EDDIES [1]   |
| <input checked="" type="checkbox"/> 0.7-1m [4] | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> FAST [1]                |
| <input type="checkbox"/> 0.4-0.7m [2]          | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]               | <input checked="" type="checkbox"/> MODERATE [1] |
| <input type="checkbox"/> 0.2-0.4m [1]          |                                                                   | <input type="checkbox"/> TORRENTIAL [-1]         |
| <input type="checkbox"/> < 0.2m [POOL=0]       | COMMENTS:                                                         | <input type="checkbox"/> INTERSTITIAL [-1]       |
|                                                |                                                                   | <input type="checkbox"/> INTERMITTENT [-2]       |
|                                                |                                                                   | <input type="checkbox"/> VERY FAST [1]           |

Pool/Current  
**9**  
Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                               | RUN DEPTH                                        | RIFFLE/RUN SUBSTRATE                                                   | RIFFLE/RUN EMBEDDEDNESS                     |
|------------------------------------------------------------|--------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------|
| <input checked="" type="checkbox"/> Best Areas > 10 cm [2] | <input checked="" type="checkbox"/> MAX > 50 [2] | <input checked="" type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] | <input type="checkbox"/> NONE [2]           |
| <input type="checkbox"/> Best Areas 5-10 cm [1]            | <input type="checkbox"/> MAX < 50 [1]            | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]          | <input checked="" type="checkbox"/> LOW [1] |
| <input type="checkbox"/> Best Areas < 5 cm [RIFFLE=0]      |                                                  | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]              | <input type="checkbox"/> MODERATE [0]       |
| COMMENTS:                                                  |                                                  | <input type="checkbox"/> NO RIFFLE [Metric=0]                          | <input type="checkbox"/> EXTENSIVE [-1]     |

Riffle/Run  
**7**  
Max 8

Gradient  
**10**  
Max 10

6) GRADIENT (ft/mi): 7.4 DRAINAGE AREA (sq.mi.): 35.3  
% POOL: 10 % GLIDE: 70  
% RIFFLE: 30 % RUN: 40



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 3.2  
Stream Segment Location: At Abbe Road  
QHEI Score: 69.5

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FIELD NOTES: 21 AUG 2002

This portion of French Creek is located on the east side of Abbe Road. The creek has a low sinuosity with a mix of riffles and pools. The channel width ranges from 25-40' with a maximum pool depth of 75 cm. The substrate is dominated by boulders, cobbles, sand and gravel. Lesser amounts of silt are also present. The riparian forest bordering each bank ranges from 20' to greater than 100' and is dominated by green ash, red oak, American elm, mulberry, black walnut and black willow. Small amounts of emergent vegetation (i.e. duck potato, jewel weed) are located on gravel bars within the creek. The banks are generally 5-10' high. Crayfish and frogs were noted in the stream. Some household garbage was noted on the north bank (appliances, etc.).

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PHOTOS:



1) French Creek 3.2 – Facing upstream (east) of Abbe Road



2) French Creek 3.2 – Facing downstream from Abbe Road



3) French Creek 3.2 – Debris on bank



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

69 1/2

River Code: RM: 3.2 Stream: FRENCH CREEK
Date: 08-21-02 Location: AT ABBE ROAD (ROUTE 301)
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
BLDR/SLBS, BOULDER, COBBLE, HARDPAN, MUCK, SILT, GRAVEL, SAND, BEDROCK, DETRITUS, ARTIFICIAL, LIMESTONE, SILT, TILLS, WETLANDS, HARDPAN, SANDSTONE, RIP/RAP, LACUSTRINE, SHALE, COAL FINES, SILT HEAVY, SILT MODERATE, SILT NORMAL, SILT FREE, EXTENSIVE, MODERATE, NORMAL, NONE

NUMBER OF SUBSTRATE TYPES: 4 or More [2]
COMMENTS:
2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)
UNDERCUT BANKS, OVERHANGING VEGETATION, SHALLOWS, ROOTMATS, POOLS, ROOTWADS, BOULDERS, OXBOWS, AQUATIC MACROPHYTES, LOGS OR WOODY DEBRIS

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
HIGH, MODERATE, LOW, NONE, EXCELLENT, GOOD, FAIR, POOR, NONE, RECOVERED, RECOVERING, RECENT OR NO RECOVERY, HIGH, MODERATE, LOW, SNAGGING, RELOCATION, CANOPY REMOVAL, DREDGING, IMPOUND, ISLANDS, LEVEED, BANK SHAPING, ONE SIDE CHANNEL MODIFICATIONS

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)
RIPARIAN WIDTH FLOOD PLAIN QUALITY BANK EROSION
WIDE, MODERATE, NARROW, VERY NARROW, FOREST, SHRUB, RESIDENTIAL, FENCED PASTURE, CONSERVATION, URBAN, OPEN PASTURE, MINING, NONE/LITTLE, MODERATE, HEAVY/SEVERE

5) POOL/GLIDE AND RIFFLE/RUN QUALITY
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY
>1m, 0.7-1m, 0.4-0.7m, 0.2-0.4m, <0.2m, POOL WIDTH > RIFFLE WIDTH, POOL WIDTH = RIFFLE WIDTH, POOL WIDTH < RIFFLE W., EDDIES, FAST, MODERATE, SLOW, TORRENTIAL, INTERSTITIAL, INTERMITTENT, VERY FAST

6) GRADIENT (ft/mi): 6.8 DRAINAGE AREA (sq.mi.): 31.7
%POOL: 10 %GLIDE: 25
%RIFFLE: 30 %RUN: 35

CHECK ONE OR CHECK 2 AND AVERAGE
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS
Best Areas >10 cm, Best Areas 5-10 cm, Best Areas <5 cm, MAX > 50, MAX < 50, STABLE, MOD. STABLE, UNSTABLE, NONE, LOW, MODERATE, EXTENSIVE, NO RIFFLE

COMMENTS:
\*\* Best areas must be large enough to support a population of riffle-obligate species



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 4.0  
Stream Segment Location: At mouth of Avins Ditch  
QHEI Score: 64.5

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FIELD NOTES: 21 AUG 2002

This section of French Creek is located south of Colorado Road at the confluence of Avins Ditch. The riparian area is narrow, with residential and commercial development on the north (south side of Colorado Ave.), and a cell tower and utility lines to the south. Spoils were located on the south bank, indicating that the creek had apparently been dredged at one time. The narrow wooded buffer on portions of the north bank are dominated by willow, eastern cottonwood and boxelder. The south bank can best be described as shrub/scrub/disturbed with dominant species including: Japanese knotweed (Exotic), gray-stemmed dogwood, field bindweed, multiflora rose and raspberry bushes. The substrate in the creek is dominated by gravel, sand, boulders, cobbles and silt. Many fish were noted in this section with macro invertebrates, including crayfish. Potential for restoration includes tree plantings along the banks.

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PHOTOS:



1) French Creek 4.0 – Facing downstream from the south.



2) French Creek 4.0 – Facing upstream from end of sample



3) French Creek 4.0 – Facing upstream (out of sample area)



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **64.5**

River Code: RM: 4.0 Stream: FRENCH CREEK  
Date: 08-21-02 Location: AT MOUTH OF RUINS DITCH  
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present

TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY  
 BLDR /SLBS [10]  GRAVEL [7] 20 35 Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)  
 BOULDER [9] 20 15  SAND [6] 40 20  LIMESTONE [1] SILT:  SILT HEAVY [-2]  
 COBBLE [8] 20  BEDROCK [5]  TILLS [1]  SILT MODERATE [-1] Substrate  
 HARDPAN [4]  DETRITUS [3]  WETLANDS [0]  SILT NORMAL [0] **14**  
 MUCK [2]  ARTIFICIAL [0]  HARDPAN [0]  SILT FREE [1] **Max 20**  
 SILT [2] 20 10 NOTE: Ignore Sludge Originating From Point Sources  SANDSTONE [0] EMBEDDED  EXTENSIVE [-2]  
 RIP/RAP [0] NESS:  MODERATE [-1]  
 LACUSTRINE [0]  NORMAL [0]  
 SHALE [-1]  NONE [1]  
 COAL FINES [-2]

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
(High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS:

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)  
(Structure) TYPE: Score All That Occur

0 UNDERCUT BANKS [1] 0 POOLS > 70 cm [2] 0 OXBOWS, BACKWATERS [1]  EXTENSIVE > 75% [11] Cover  
1 OVERHANGING VEGETATION [1] 0 ROOTWADS [1] 2 AQUATIC MACROPHYTES [1]  MODERATE 25-75% [7] **11**  
3 SHALLOWS (IN SLOW WATER) [1] 3 BOULDERS [1] 1 LOGS OR WOODY DEBRIS [1]  SPARSE 5-25% [3] **Max 20**  
1 ROOTMATS [1] COMMENTS: LOTS OF FISH / CRAYFISH NOTED  NEARLY ABSENT < 5% [1]

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER  
 HIGH [4]  EXCELLENT [7]  NONE [6]  HIGH [3]  SNAGGING  IMPOUND.  
 MODERATE [3]  GOOD [5]  RECOVERED [4]  MODERATE [2]  RELOCATION  ISLANDS  
 LOW [2]  FAIR [3]  RECOVERING [3]  LOW [1]  CANOPY REMOVAL  LEVEED  
 NONE [1]  POOR [1]  RECENT OR NO RECOVERY [1]  DREDGING  BANK SHAPING  
 ONE SIDE CHANNEL MODIFICATIONS Channel **14** **Max 20**

COMMENTS:

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION  
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)  
 WIDE > 50m [4]  FOREST, SWAMP [3]  CONSERVATION TILLAGE [1]  NONE/LITTLE [3] Riparian  
 MODERATE 10-50m [3]  SHRUB OR OLD FIELD [2]  URBAN OR INDUSTRIAL [0]  MODERATE [2] **7 1/2**  
 NARROW 5-10 m [2]  RESIDENTIAL, PARK, NEW FIELD [1]  OPEN PASTURE, ROWCROP [0]  HEAVY/SEVERE [1] **Max 10**  
 VERY NARROW < 5 m [1]  FENCED PASTURE [1]  MINING/CONSTRUCTION [0]  
 NONE [0]

COMMENTS:

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [ POOLS & RIFFLES! ] Pool/Current  
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)  
 > 1m [6]  POOL WIDTH > RIFFLE WIDTH [2]  EDDIES [1]  TORRENTIAL [-1] **5**  
 0.7-1m [4]  POOL WIDTH = RIFFLE WIDTH [1]  FAST [1]  INTERSTITIAL [-1] **Max 12**  
 0.4-0.7m [2]  POOL WIDTH < RIFFLE W. [0]  MODERATE [1]  INTERMITTENT [-2]  
 0.2-0.4m [1]  SLOW [1]  VERY FAST [1]  
 < 0.2m [POOL=0] COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE Riffle/Run

RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS  
 Best Areas > 10 cm [2]  MAX > 50 [2]  STABLE (e.g., Cobble, Boulder) [2]  NONE [2] **3**  
 Best Areas 5-10 cm [1]  MAX < 50 [1]  MOD. STABLE (e.g., Large Gravel) [1]  LOW [1] **Max 8**  
 Best Areas < 5 cm [RIFFLE=0]  UNSTABLE (Fine Gravel, Sand) [0]  MODERATE [0] **Gradient**  
COMMENTS:  NO RIFFLE [Metric=0]  EXTENSIVE [-1] **10** **Max 10**

6] GRADIENT (ft/mi): 6.7 DRAINAGE AREA (sq.mi.): 31.1 %POOL: 20 %GLIDE: 10  
%RIFFLE: 35 %RUN: 35

\* Best areas must be large enough to support a population of riffle-obligate species



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 4.5  
Stream Segment Location: At I-90 crossing  
QHEI Score: 43.5

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FIELD NOTES: 09 SEP 2002

This portion of French Creek is located to the southeast of I-90 near the Colorado Avenue interchange. The creek has very little sinuosity and has a substrate dominated by gravel and silt, with some boulders, cobbles, and sand. The riparian buffer above the 10-12' banks ranges in width from 50-150' with old fields beyond the forested riparian area. Dominant species adjacent to the creek include boxelder, eastern cottonwood, black willow and gray-stemmed dogwood. Intermittent narrow herbaceous fringes are dominated by blue vervain and reed canary grass. Some areas of the streambed were dry during the investigation with water levels generally 10-50 cm. The SW corner of I-90 and Colorado Ave. is currently under heavy excavation/fill. The lack of silt fencing poses a high erosion potential and siltation of the creek. In addition, various ATV trails cross the creek as well as evidence of pickup trucks being driven down the creek bed itself. Minnows and macro invertebrates were noted.

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PHOTOS:



1) French Creek 4.5 – Facing upstream from SW of I-90



2) French Creek 4.5 – Facing downstream towards I-90



3) French Creek 4.5 – Facing downstream (end of sample).



4) French Creek 4.5 – ATV trails on south side of creek



5) French Creek 4.5 – Vehicle tracks in creek bed



6) French Creek 4.5 - Construction on north bank



7) French Creek 4.5 - Construction on north bank adjacent to I-90 access road



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

43 1/2

River Code: RM: 4.5 Stream: FRENCH CREEK
Date: 09-09-02 Location: AT I-90
Scorers Full Name: JAY MILLER Affiliation: USACE-BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
[ ] -BLDR /SLBS [10] [ ] -GRAVEL [7] 40 60 Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)
[ ] -BOULDER [9] 5 5 [ ] -SAND [6] 20 10 [ ] -LIMESTONE [1] SILT: [ ] - SILT HEAVY [-2]
[ ] -COBBLE [8] 10 10 [ ] -BEDROCK [5] [ ] -TILLS [1] [ ] -SILT MODERATE [-1] Substrate
[ ] -HARDPAN [4] [ ] -DETRITUS [3] [ ] -WETLANDS [0] [ ] -SILT NORMAL [0]
[ ] -MUCK [2] [ ] -ARTIFICIAL [0] [ ] -HARDPAN [0] [ ] -SILT FREE [1]
[ ] -SILT [2] 25 15 NOTE: Ignore Sludge Originating From Point Sources [ ] -SANDSTONE [0] EMBEDDED [ ] -EXTENSIVE [-2] Max 20
[ ] -RIP/RAP [0] NESS: [ ] -MODERATE [-1]
[ ] -LACUSTRINE [0] [ ] -NORMAL [0]
[ ] -SHALE [-1] [ ] -NONE [1]
[ ] -COAL FINES [-2]

NUMBER OF SUBSTRATE TYPES: [ ] 4 or More [2]
(High Quality Only, Score 5 or >) [ ] 3 or Less [0]
COMMENTS: WATER VERY TURBID WHEN DISTURBED

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) AMOUNT: (Check ONLY One or check 2 and AVERAGE)
(Structure) TYPE: Score All That Occur Cover
1 UNDERCUT BANKS [1] 0 POOLS > 70 cm [2] 0 OXBOWS, BACKWATERS [1] [ ] - EXTENSIVE > 75% [11]
1 OVERHANGING VEGETATION [1] 0 ROOTWADS [1] 0 AQUATIC MACROPHYTES [1] [ ] - MODERATE 25-75% [7]
2 SHALLOWS (IN SLOW WATER) [1] 1 BOULDERS [1] 1 LOGS OR WOODY DEBRIS [1] [ ] - SPARSE 5-25% [3] Max 20
1 ROOTMATS [1] COMMENTS: [ ] - NEARLY ABSENT < 5% [1]

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER Channel
[ ] - HIGH [4] [ ] - EXCELLENT [7] [ ] - NONE [6] [ ] - HIGH [3] [ ] - SNAGGING [ ] - IMPOUND.
[ ] - MODERATE [3] [ ] - GOOD [5] [ ] - RECOVERED [4] [ ] - MODERATE [2] [ ] - RELOCATION [ ] - ISLANDS
[ ] - LOW [2] [ ] - FAIR [3] [ ] - RECOVERING [3] [ ] - LOW [1] [ ] - CANOPY REMOVAL [ ] - LEVEED
[ ] - NONE [1] [ ] - POOR [1] [ ] - RECENT OR NO RECOVERY [1] [ ] - DREDGING [ ] - BANK SHAPING
[ ] - ONE SIDE CHANNEL MODIFICATIONS

COMMENTS: FAIRLY STRAIGHT

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION Riparian
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)
[ ] - WIDE > 50m [4] [ ] - FOREST, SWAMP [3] [ ] - CONSERVATION TILLAGE [1] [ ] - NONE/LITTLE [3] 4 1/2
[ ] - MODERATE 10-50m [3] [ ] - SHRUB OR OLD FIELD [2] [ ] - URBAN OR INDUSTRIAL [0] [ ] - MODERATE [2]
[ ] - NARROW 5-10 m [2] [ ] - RESIDENTIAL, PARK, NEW FIELD [1] [ ] - OPEN PASTURE, ROWCROP [0] [ ] - HEAVY/SEVERE [1] Max 10
[ ] - VERY NARROW <5 m [1] [ ] - FENCED PASTURE [1] [ ] - MINING/CONSTRUCTION [0]
[ ] - NONE [0]

COMMENTS: NARROW WOODED, THEN NEWFIELD ON BOTH SIDES

5) POOL/GLIDE AND RIFFLE/RUN QUALITY
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY ( POOLS & RIFFLES! ) Pool/ Current
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)
[ ] - >1m [6] [ ] - POOL WIDTH > RIFFLE WIDTH [2] [ ] - EDDIES [1] [ ] - TORRENTIAL [-1]
[ ] - 0.7-1m [4] [ ] - POOL WIDTH = RIFFLE WIDTH [1] [ ] - FAST [1] [ ] - INTERSTITIAL [-1]
[ ] - 0.4-0.7m [2] [ ] - POOL WIDTH < RIFFLE W. [0] [ ] - MODERATE [1] [ ] - INTERMITTENT [-2]
[ ] - 0.2-0.4m [1] [ ] - SLOW [1] [ ] - VERY FAST [1]
[ ] - < 0.2m [POOL=0] COMMENTS: MOSTLY GLIDE - SLOW, SOMETIMES INTERMITTENT FLOW

CHECK ONE OR CHECK 2 AND AVERAGE
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS Riffle/Run
[ ] - Best Areas >10 cm [2] [ ] - MAX > 50 [2] [ ] - STABLE (e.g., Cobble, Boulder) [2] [ ] - NONE [2]
[ ] - Best Areas 5-10 cm [1] [ ] - MAX < 50 [1] [ ] - MOD. STABLE (e.g., Large Gravel) [1] [ ] - LOW [1] Max 8
[ ] - Best Areas < 5 cm [RIFFLE=0] [ ] - UNSTABLE (Fine Gravel, Sand) [0] [ ] - MODERATE [0] Gradient
COMMENTS: SHAL + NARROW RIFFLES [ ] - EXTENSIVE [-1]
[ ] - NO RIFFLE [Metric=0] Max 10

6) GRADIENT (ft/mi): 8.1 DRAINAGE AREA (sq.mi.): 29.9 %POOL: 15 %GLIDE: 70
%RIFFLE: 5 %RUN: 10

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Major Suspected Sources of Impacts (Check All That Apply):

- None
- Industrial
- WWTP
- Ag
- Livestock
- Silviculture
- Construction
- Urban Runoff
- CSOs
- Suburban Impacts
- Mining
- Channelization
- Riparian Removal
- Landfills
- Natural
- Dams
- Other Flow Alteration
- Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:

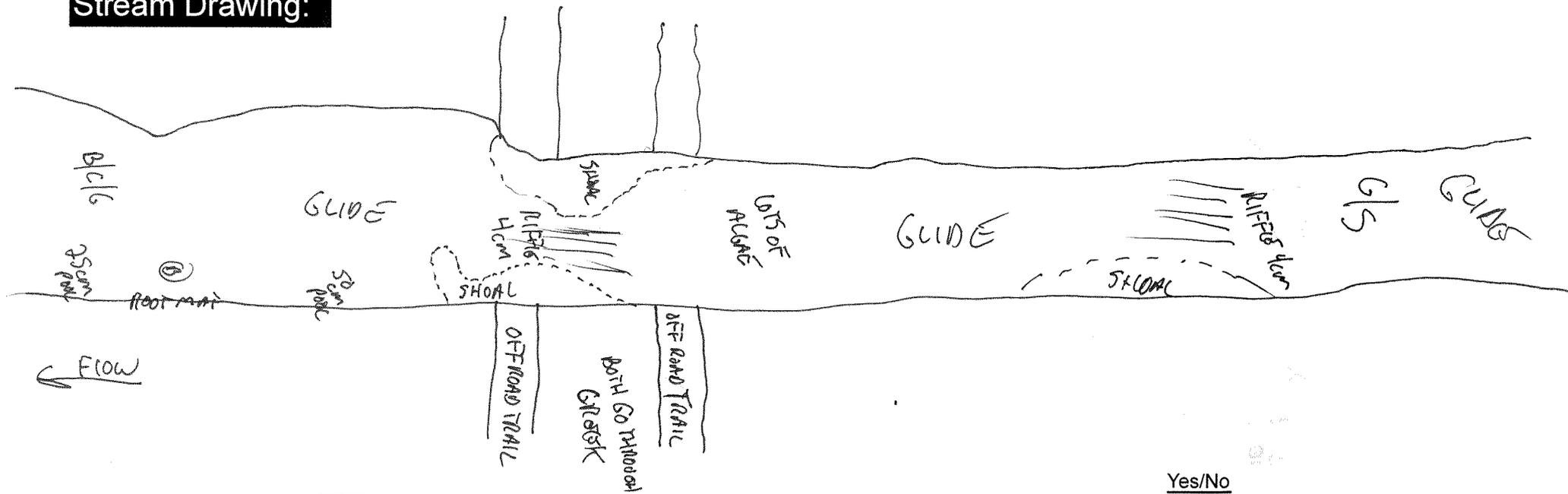
- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

| Stream Measurements: |               |               |                    |                     |           |                    |                 |       |                 |  |
|----------------------|---------------|---------------|--------------------|---------------------|-----------|--------------------|-----------------|-------|-----------------|--|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Mean Depth | W/D Ratio | Bankfull Max Depth | Floodprone Area | Width | Entrench. Ratio |  |
|                      |               |               |                    |                     |           |                    |                 |       |                 |  |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

Yes/No

Is Stream Ephemeral (no pools, totally dry or only damp spots)?

Is there water upstream? How Far: \_\_\_\_\_

Is There Water Close Downstream? How Far: \_\_\_\_\_

Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 5.5  
Stream Segment Location: At Bridge Point Trail Road  
QHEI Score: 61.75

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FIELD NOTES: 10 SEP 2002

This portion of French Creek is located to the east of Bridge Pointe Trail to the south of Colorado Ave. The substrate is a mix of bedrock, boulders, cobbles, gravel and sand. The creek is 30' wide and minnows, frogs, and a muskrat were noted. The narrow (50') buffers contained eastern cottonwood, black willow, green ash, pin oak, American elm, black walnut, black cherry, staghorn sumac, red maple and multiflora rose. The medium velocity portion of the creek is 10-25 cm. Deep. Possible contamination from a carwash along Colorado Ave. was noted along the north bank. It was rust colored. Minor amounts of algae were noted. The banks are 5-10' high.

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PHOTOS:



1) French Creek 5.5 – Facing upstream from bridge.



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **67/74**

River Code: RM: 5.5 Stream: FRONCH CROOK  
Date: 09/10/02 Location: AT BRIDGE POINTE TRAIL  
Scorer's Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)  
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY  
 -BLDR /SLBS[10] 5 10  -GRAVEL [7] 15 30 Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)  
 -BOULDER [9]  -SAND [6] 15  -LIMESTONE [1] SILT:  -SILT HEAVY [-2]  
 -COBBLE [8] 30 30  -BEDROCK[5] 30 30  -TILLS [1]  -SILT MODERATE [-1] Substrate  
 -HARDPAN [4]  -DETRITUS[3]  -WETLANDS[0]  -SILT NORMAL [0]  
 -MUCK [2]  -ARTIFICIAL[0]  -HARDPAN [0]  -SILT FREE [1]  -EXTENSIVE [-2] Max 20  
 -SILT [2] 5 NOTE: Ignore Sludge Originating From Point Sources  -SANDSTONE [0] EMBEDDED  -MODERATE [-1]  
 -RIP/RAP [0] NESS:  -NORMAL [0]  
 -LACUSTRINE [0]  -NON E [1]  
 -SHALE [-1]  
 -COAL FINES [-2]

NUMBER OF SUBSTRATE TYPES:  4 or More [2] (High Quality Only, Score 5 or >)  3 or Less [0]  
COMMENTS: ALTERNATES BETWEEN HIGH SAND/ROCK + HIGH COBBLE

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) AMOUNT: (Check ONLY One or check 2 and AVERAGE)  
(Structure) TYPE: Score All That Occur  
2 UNDERCUT BANKS [1] 0 POOLS > 70 cm [2] 0 OXBOWS, BACKWATERS [1]  - EXTENSIVE > 75% [11] Cover  
1 OVERHANGING VEGETATION [1] 0 ROOTWADS [1] 0 AQUATIC MACROPHYTES [1]  - MODERATE 25-75% [7] Max 20  
2 SHALLOWS (IN SLOW WATER) [1] 3 BOULDERS [1] 2 LOGS OR WOODY DEBRIS [1]  - SPARSE 5-25% [3]  
1 ROOTMATS [1] COMMENTS:  - NEARLY ABSENT < 5%[1]

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )  
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER  
 - HIGH [4]  - EXCELLENT [7]  - NONE [6]  - HIGH [3]  - SNAGGING  - IMPOUND.  
 - MODERATE [3]  - GOOD [5]  - RECOVERED [4]  - MODERATE [2]  - RELOCATION  - ISLANDS  
 - LOW [2]  - FAIR [3]  - RECOVERING [3]  - LOW [1]  - CANOPY REMOVAL  - LEVEED  
 - NONE [1]  - POOR [1]  - RECENT OR NO RECOVERY [1]  - DREDGING  - BANK SHAPING  
 - ONE SIDE CHANNEL MODIFICATIONS Channel Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream  
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION  
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)  
 - WIDE > 50m [4]  - FOREST, SWAMP [3]  - CONSERVATION TILLAGE [1]  - NONE/LITTLE [3] Riparian  
 - MODERATE 10-50m [3]  - SHRUB OR OLD FIELD [2]  - URBAN OR INDUSTRIAL [0]  - MODERATE [2] Max 10  
 - NARROW 5-10 m [2]  - RESIDENTIAL, PARK, NEW FIELD [1]  - OPEN PASTURE, ROWCROP [0]  - HEAVY/SEVERE [1]  
 - VERY NARROW <5 m[1]  - FENCED PASTURE [1]  - MINING/CONSTRUCTION [0]  
 - NONE [0]

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY  
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY (POOLS & RIFFLES!) Pool/Current  
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)  
 - >1m [6]  - POOL WIDTH > RIFFLE WIDTH [2]  - EDDIES [1]  - TORRENTIAL [-1] Max 12  
 - 0.7-1m [4]  - POOL WIDTH = RIFFLE WIDTH [1]  - FAST [1]  - INTERSTITIAL [-1]  
 - 0.4-0.7m [2]  - POOL WIDTH < RIFFLE W. [0]  - MODERATE [1]  - INTERMITTENT [-2]  
 - 0.2-0.4m [1]  - SLOW [1]  - VERY FAST [1]  
 - < 0.2m [POOL=0] COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE  
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS Riffle/Run  
 - Best Areas >10 cm [2]  - MAX > 50 [2]  - STABLE (e.g., Cobble, Boulder) [2]  - NONE [2] Max 8  
 - Best Areas 5-10 cm [1]  - MAX < 50 [1]  - MOD. STABLE (e.g., Large Gravel) [1]  - LOW [1]  
 - Best Areas < 5 cm [RIFFLE=0]  - UNSTABLE (Fine Gravel, Sand) [0]  - MODERATE [0] Gradient  
COMMENTS:  - NO RIFFLE [Metric=0]  - EXTENSIVE [-1] Max 10

6) GRADIENT (ft/mi): 31.6 DRAINAGE AREA (sq.mi.): 28 %POOL: 20 %GLIDE: 30  
%RIFFLE: 30 %RUN: 20

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

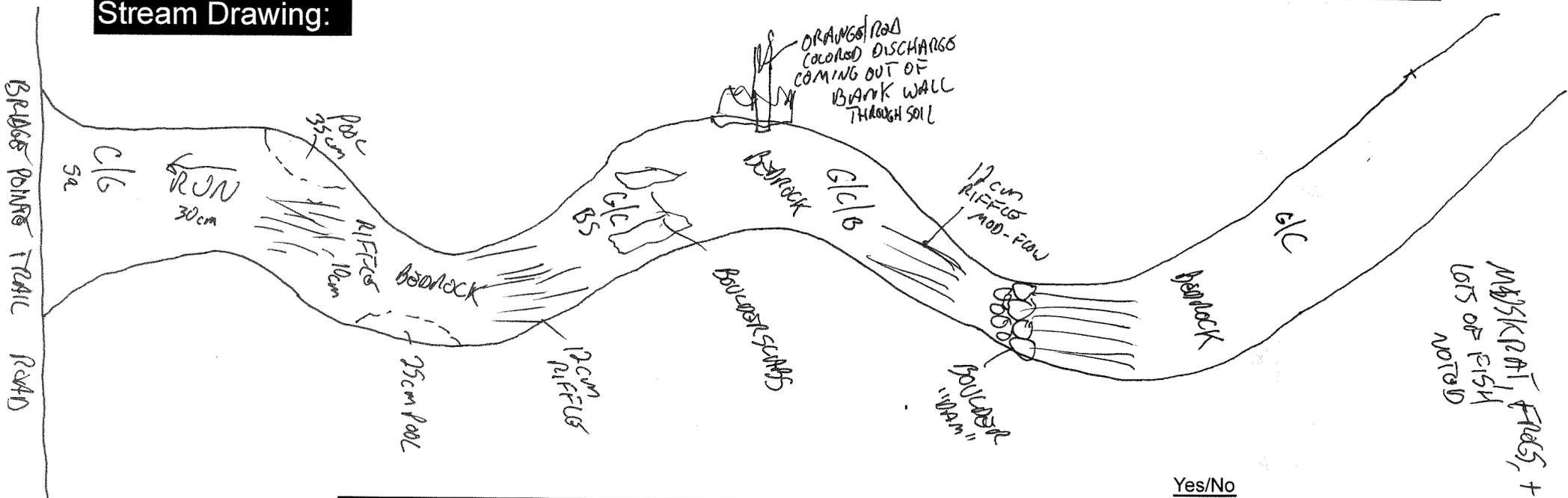
|                      |               |               |                    |                      |                    |                      |
|----------------------|---------------|---------------|--------------------|----------------------|--------------------|----------------------|
|                      |               | Gear: _____   | Distance: _____    | Water Clarity: _____ | Water Stage: _____ | Canopy -% Open _____ |
| First Sampling Pass  | _____         | _____         | _____              | _____                | _____              | _____                |
| Stream Measurements: |               |               |                    |                      |                    |                      |
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth       | Mean W/D Ratio     | Bankfull Max Depth   |
|                      |               |               |                    |                      |                    |                      |
|                      |               |               |                    |                      |                    |                      |
|                      |               |               |                    |                      |                    |                      |
|                      |               |               |                    |                      |                    |                      |
|                      |               |               |                    |                      |                    |                      |

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:  - Low,  - Moderate,  - High

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

Yes/No

Is Stream Ephemeral (no pools, totally dry or only damp spots)?

Is there water upstream? How Far: \_\_\_\_\_

Is There Water Close Downstream? How Far: \_\_\_\_\_

Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 6.1  
Stream Segment Location: At Detroit Road  
QHEI Score: 59

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FIELD NOTES: 10 SEP 2002

This portion of French Creek is located upstream (southeast) of Detroit Road. The south bank has a 8+/-' retaining wall along an apartment complex with no buffer. The north bank has a 20-25' wide buffer between residential developments, but becomes wider (100+' to +/- 500') upstream of the bridge. The sand and cobble-dominated substrate also contains boulders, gravel, bedrock, and silt. The forested riparian area contained black walnut, black locust, eastern cottonwood, sycamore, boxelder, Japanese knotweed, hophornbeam, black willow, mulberry, sugar maple, white ash, American basswood, and green ash. A portion of the north bank has bank protection comprised of demolition debris (concrete). Minnows and macro invertebrates were noted. A good pool/riffle complex ranged in depth from 5-50 cm. The creek was 35' wide and has 5-10' banks on either side.

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PHOTOS:



1) French Creek 6.1 – Facing upstream from bridge.



2) French Creek 6.1 – Facing downstream from end of sample.



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

59

River Code: RM: 6.1 Stream: FRENCH CREEK

Date: 9/10/02 Location: AT DETROIT ROAD (ROUTE 254)

Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present

TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
BLDR /SLBS[10] 10 5 SAND [6] 25 20 LESTONE [1] SILT:
COBBLE [8] 30 35 BEDROCK[5] 5 5 TILLS [1]
HARDPAN [4] DETRITUS[3] WETLANDS[0]
MUCK [2] ARTIFICIAL[0] HARDPAN [0]
SILT [2] 10 20 NOTE: Ignore Sludge Originating From Point Sources
SANDSTONE [0] EMBEDDED
RIP/RAP [0] NESS:
LACUSTRINE [0]
SHALE [-1]
COAL FINES [-2]

Substrate 14 1/2 Max 20

NUMBER OF SUBSTRATE TYPES: 4 or More [2] 3 or Less [0]

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

TYPE: Score All That Occur AMOUNT: (Check ONLY One or check 2 and AVERAGE)
UNDERCUT BANKS [1] POOLS > 70 cm [2] OXBOWS, BACKWATERS [1]
OVERHANGING VEGETATION [1] ROOTWADS [1] AQUATIC MACROPHYTES [1]
SHALLOWS (IN SLOW WATER) [1] BOULDERS [1] LOGS OR WOODY DEBRIS [1]
ROOTMATS [1] COMMENTS:
EXTENSIVE > 75% [11]
MODERATE 25-75% [7]
SPARSE 5-25% [3]
NEARLY ABSENT < 5%[1]

Cover 6 Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
HIGH [4] EXCELLENT [7] NONE [6] HIGH [3] SNAGGING IMPOUND.
MODERATE [3] GOOD [5] RECOVERED [4] MODERATE [2] RELOCATION ISLANDS
LOW [2] FAIR [3] RECOVERING [3] LOW [1] CANOPY REMOVAL LEVEED
NONE [1] POOR [1] RECENT OR NO RECOVERY [1] DREDGING BANK SHAPING
ONE SIDE CHANNEL MODIFICATIONS

Channel 4 Max 20

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)
WIDE > 50m [4] FOREST, SWAMP [3] CONSERVATION TILLAGE [1] NONE/LITTLE [3]
MODERATE 10-50m [3] SHRUB OR OLD FIELD [2] URBAN OR INDUSTRIAL [0] MODERATE [2]
NARROW 5-10 m [2] RESIDENTIAL, PARK, NEW FIELD [1] OPEN PASTURE, ROWCROP [0] HEAVY/SEVERE [1]
VERY NARROW < 5 m [1] FENCED PASTURE [1] MINING/CONSTRUCTION [0]
NONE [0]

Riparian 4 1/2 Max 10

COMMENTS:

5.) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH MORPHOLOGY CURRENT VELOCITY ( POOLS & RIFFLES!)
> 1m [6] POOL WIDTH > RIFFLE WIDTH [2] EDDIES [1] TORRENTIAL [-1]
0.7-1m [4] POOL WIDTH = RIFFLE WIDTH [1] FAST [1] INTERSTITIAL [-1]
0.4-0.7m [2] POOL WIDTH < RIFFLE W. [0] MODERATE [1] INTERMITTENT [-2]
0.2-0.4m [1] SLOW [1] VERY FAST [1]
< 0.2m [POOL=0] COMMENTS:

Pool/Current 6 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS
Best Areas > 10 cm [2] MAX > 50 [2] STABLE (e.g., Cobble, Boulder) [2] NONE [2]
Best Areas 5-10 cm [1] MAX < 50 [1] MOD. STABLE (e.g., Large Gravel) [1] LOW [1]
Best Areas < 5 cm [RIFFLE=0] UNSTABLE (Fine Gravel, Sand) [0] MODERATE [0]
EXTENSIVE [-1]
NO RIFFLE [Metric=0]

Riffle/Run 4 Max 8 Gradient 10 Max 10

6) GRADIENT (ft/mi): 11.6 DRAINAGE AREA (sq.mi.): 27.8 %POOL: 30 %GLIDE: 40 %RIFFLE: 10 %RUN: 20

\*\* Best areas must be large enough to support a population of riffle-obligate species



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 6.9  
Stream Segment Location: At Stony Ridge Road (RT. 611)  
QHEI Score: 69.25

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FIELD NOTES: 10 SEP 2002

This portion of French Creek is located upstream (east) of Stony Ridge Road. The substrate is a combination of gravel, sand, bedrock, cobbles, boulders and silt. The 18-30' wide stretch ranges in depth from 25-75 cm. Frogs, ducks, and minnows were noted. The north bank has a fairly wide riparian buffer of cottonwood, black willow, black walnut, boxelder, hophornbeam, American basswood, and multiflora rose. The south bank has little or no buffer to the adjacent residential development. A PVC pipe was noted draining a residential lot to the south.

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PHOTOS:



1) French Creek 6.9 - Facing upstream from bridge



2) French Creek 6.9 – Tributary entering from south



3) French Creek 6.9 – Facing downstream from end of sample



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

69 1/4

River Code: RM: 6.9 Stream: FRENCH CREEK
Date: 9/10/02 Location: AT STONEY RIDGE ROAD
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
[ ] BLDR /SLBS [10] 5 15 [ ] GRAVEL [7] 20 15 Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)
[ ] BOULDER [9] [ ] SAND [6] 15 10 [ ] LIMESTONE [1] SILT: [ ] SILT HEAVY [-2]
[ ] COBBLE [8] 20 20 [ ] BEDROCK [5] 25 30 [ ] TILLS [1] [ ] SILT MODERATE [-1]
[ ] HARDPAN [4] [ ] DETRITUS [3] [ ] WETLANDS [0] [ ] SILT NORMAL [0]
[ ] MUCK [2] [ ] ARTIFICIAL [0] [ ] HARDPAN [0] [ ] SILT FREE [1]
[ ] SILT [2] 15 10 NOTE: Ignore Sludge Originating From Point Sources [ ] SANDSTONE [0] EMBEDDED [ ] EXTENSIVE [-2]
[ ] RIP/RAP [0] NESS: [ ] MODERATE [-1]
[ ] LACUSTRINE [0] [ ] NORMAL [0]
[ ] SHALE [-1] [ ] NONE [1]
[ ] COAL FINES [-2]

Substrate
15 1/2
Max 20

NUMBER OF SUBSTRATE TYPES: 4 or More [2]
(High Quality Only, Score 5 or >) [ ] 3 or Less [0]

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)
(Structure) TYPE: Score All That Occur AMOUNT: (Check ONLY One or check 2 and AVERAGE)
3 UNDERCUT BANKS [1] 1 POOLS > 70 cm [2] 0 OXBOWS, BACKWATERS [1] [ ] EXTENSIVE > 75% [11]
2 OVERHANGING VEGETATION [1] 0 ROOTWADS [1] 0 AQUATIC MACROPHYTES [1] [ ] MODERATE 25-75% [7]
1 SHALLOWS (IN SLOW WATER) [1] 2 BOULDERS [1] 1 LOGS OR WOODY DEBRIS [1] [ ] SPARSE 5-25% [3]
1 ROOTMATS [1] COMMENTS: [ ] NEARLY ABSENT < 5% [1]

Cover
11
Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
[ ] HIGH [4] [ ] EXCELLENT [7] [ ] NONE [6] [ ] HIGH [3] [ ] SNAGGING [ ] IMPOUND.
[ ] MODERATE [3] [ ] GOOD [5] [ ] RECOVERED [4] [ ] MODERATE [2] [ ] RELOCATION [ ] ISLANDS
[ ] LOW [2] [ ] FAIR [3] [ ] RECOVERING [3] [ ] LOW [1] [ ] CANOPY REMOVAL [ ] LEVEED
[ ] NONE [1] [ ] POOR [1] [ ] RECENT OR NO RECOVERY [1] [ ] DREDGING [ ] BANK SHAPING
[ ] ONE SIDE CHANNEL MODIFICATIONS

Channel
14
Max 20

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)
[ ] WIDE > 50m [4] [ ] FOREST, SWAMP [3] [ ] CONSERVATION TILLAGE [1] [ ] NONE/LITTLE [3]
[ ] MODERATE 10-50m [3] [ ] SHRUB OR OLD FIELD [2] [ ] URBAN OR INDUSTRIAL [0] [ ] MODERATE [2]
[ ] NARROW 5-10 m [2] [ ] RESIDENTIAL, PARK, NEW FIELD [1] [ ] OPEN PASTURE, ROWCROP [0] [ ] HEAVY/SEVERE [1]
[ ] VERY NARROW < 5 m [1] [ ] FENCED PASTURE [1] [ ] MINING/CONSTRUCTION [0]
[ ] NONE [0]

Riparian
4 3/4
Max 10

5] POOL/GLIDE AND RIFFLE/RUN QUALITY
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY (POOLS & RIFFLES!)
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)
[ ] > 1m [6] [ ] POOL WIDTH > RIFFLE WIDTH [2] [ ] EDDIES [1] [ ] TORRENTIAL [-1]
[ ] 0.7-1m [4] [ ] POOL WIDTH = RIFFLE WIDTH [1] [ ] FAST [1] [ ] INTERSTITIAL [-1]
[ ] 0.4-0.7m [2] [ ] POOL WIDTH < RIFFLE W. [0] [ ] MODERATE [1] [ ] INTERMITTENT [-2]
[ ] 0.2-0.4m [1] [ ] COMMENTS: [ ] SLOW [1] [ ] VERY FAST [1]
[ ] < 0.2m [POOL=0]

Pool/Current
8
Max 12

CHECK ONE OR CHECK 2 AND AVERAGE
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS
[ ] Best Areas > 10 cm [2] [ ] MAX > 50 [2] [ ] STABLE (e.g., Cobble, Boulder) [2] [ ] NONE [2]
[ ] Best Areas 5-10 cm [1] [ ] MAX < 50 [1] [ ] MOD. STABLE (e.g., Large Gravel) [1] [ ] LOW [1]
[ ] Best Areas < 5 cm [ ] RIFFLE=0 [ ] UNSTABLE (Fine Gravel, Sand) [0] [ ] MODERATE [0]
[ ] COMMENTS: [ ] NO RIFFLE [Metric=0] [ ] EXTENSIVE [-1]

Riffle/Run
6
Max 8

Gradient
10
Max 10

6] GRADIENT (ft/mi): 16.1 DRAINAGE AREA (sq.mi.): 97.5
% POOL: 25 % GLIDE: 30
% RIFFLE: 15 % RUN: 30

\* Best areas must be large enough to support a population of riffle-obligate species



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 7.65  
Stream Segment Location: At Center Road  
QHEI Score: 45.5

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FIELD NOTES: 10 SEP 2002

This portion of French Creek is located on the east side of Center Road immediately south of a “paper street” (West Park Road). Contamination was noted entering the creek from a road drain under the bridge. The substance was rust-colored with a foul odor. The creek is straight, channelized, deep (50-90 cm.) and narrow (20-25’ wide). There is a wide riparian area (>100’) consisting of green ash, American elm, silky dogwood, gray-stemmed dogwood, northern arrowwood, wild cranberry bush (*Viburnum*), sycamore, American basswood, multiflora rose, pin oak, tulip tree and hawthorne. Frogs were also noted. There was a pump drawing water from the creek for irrigation on the south bank. A strong odor of sewage was noted in this location. The substrate was bedrock-dominated with sand, cobbles, boulders, silt and gravel.

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PHOTOS:



1) French Creek 7.65 – Facing upstream from bridge



2) French Creek 7.65 – Road drain under bridge



3) French Creek 7.65 – Facing downstream from end



4) French Creek 7.65 – Facing upstream from end



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **45.5**

River Code: RM: 7.65 Stream: FRENCH CREEK  
Date: 9/10/02 Location: AT CENTER ROAD (RTE. 83)  
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

|                                                 |                                                            |                                                             |                  |                                                         |
|-------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------|------------------|---------------------------------------------------------|
| TYPE                                            | POOL RIFFLE                                                | POOL RIFFLE                                                 | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                       |
| <input type="checkbox"/> -BLDR /SLBS [10]       | <input type="checkbox"/> -GRAVEL [7] <u>10</u>             | Check ONE (OR 2 & AVERAGE)                                  |                  | Check ONE (OR 2 & AVERAGE)                              |
| <input type="checkbox"/> -BOULDER [9] <u>15</u> | <input checked="" type="checkbox"/> -SAND [6] <u>30</u>    | <input type="checkbox"/> -LIMESTONE [1]                     | SILT:            | <input type="checkbox"/> - SILT HEAVY [-2]              |
| <input type="checkbox"/> -COBBLE [8] <u>15</u>  | <input checked="" type="checkbox"/> -BEDROCK [5] <u>20</u> | <input checked="" type="checkbox"/> -TILLS [1]              |                  | <input checked="" type="checkbox"/> -SILT MODERATE [-1] |
| <input type="checkbox"/> -HARDPAN [4]           | <input type="checkbox"/> -DETRITUS [3]                     | <input type="checkbox"/> -WETLANDS [0]                      |                  | <input type="checkbox"/> -SILT NORMAL [0]               |
| <input type="checkbox"/> -MUCK [2]              | <input type="checkbox"/> -ARTIFICIAL [0]                   | <input type="checkbox"/> -HARDPAN [0]                       |                  | <input type="checkbox"/> -SILT FREE [1]                 |
| <input type="checkbox"/> -SILT [2] <u>10</u>    | NOTE: Ignore Sludge Originating From Point Sources         | <input checked="" type="checkbox"/> -SANDSTONE [0] EMBEDDED |                  | <input type="checkbox"/> -EXTENSIVE [-2]                |
|                                                 |                                                            | <input type="checkbox"/> -RIP/RAP [0] NESS:                 |                  | <input checked="" type="checkbox"/> -MODERATE [-1]      |
|                                                 |                                                            | <input type="checkbox"/> -LACUSTRINE [0]                    |                  | <input type="checkbox"/> -NORMAL [0]                    |
|                                                 |                                                            | <input type="checkbox"/> -SHALE [-1]                        |                  | <input type="checkbox"/> -NONE [1]                      |
|                                                 |                                                            | <input type="checkbox"/> -COAL FINES [-2]                   |                  |                                                         |

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
(High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS: NO DEFINED RIFFLES AREAS PRESENT

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

|                                       |                                                   |                    |
|---------------------------------------|---------------------------------------------------|--------------------|
| TYPE: Score All That Occur            | AMOUNT: (Check ONLY One or check 2 and AVERAGE)   | Cover              |
| <u>1</u> UNDERCUT BANKS [1]           | <input type="checkbox"/> - EXTENSIVE > 75% [11]   | <b>9</b><br>Max 20 |
| <u>2</u> OVERHANGING VEGETATION [1]   | <input type="checkbox"/> - MODERATE 25-75% [7]    |                    |
| <u>0</u> SHALLOWS (IN SLOW WATER) [1] | <input type="checkbox"/> - SPARSE 5-25% [3]       |                    |
| <u>1</u> ROOTMATS [1]                 | <input type="checkbox"/> - NEARLY ABSENT < 5% [1] |                    |
| COMMENTS:                             |                                                   |                    |

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

|                                                |                                                |                                                                 |                                                    |                                                    |                    |
|------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------|--------------------|
| SINUOSITY                                      | DEVELOPMENT                                    | CHANNELIZATION                                                  | STABILITY                                          | MODIFICATIONS/OTHER                                | Channel            |
| <input type="checkbox"/> - HIGH [4]            | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                             | <input type="checkbox"/> - HIGH [3]                | <input type="checkbox"/> - SNAGGING                | <b>5</b><br>Max 20 |
| <input type="checkbox"/> - MODERATE [3]        | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]                        | <input checked="" type="checkbox"/> - MODERATE [2] | <input type="checkbox"/> - RELOCATION              |                    |
| <input type="checkbox"/> - LOW [2]             | <input type="checkbox"/> - FAIR [3]            | <input type="checkbox"/> - RECOVERING [3]                       | <input type="checkbox"/> - LOW [1]                 | <input type="checkbox"/> - CANOPY REMOVAL          |                    |
| <input checked="" type="checkbox"/> - NONE [1] | <input checked="" type="checkbox"/> - POOR [1] | <input checked="" type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                                    | <input checked="" type="checkbox"/> - DREDGING     |                    |
|                                                |                                                |                                                                 |                                                    | <input checked="" type="checkbox"/> - BANK SHAPING |                    |

COMMENTS:

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

|                                                      |                                                             |                                                      |                    |
|------------------------------------------------------|-------------------------------------------------------------|------------------------------------------------------|--------------------|
| RIPARIAN WIDTH                                       | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)               | BANK EROSION                                         | Riparian           |
| L R (Per Bank)                                       | L R (Most Predominant Per Bank)                             | L R                                                  | <b>9</b><br>Max 10 |
| <input checked="" type="checkbox"/> - WIDE > 50m [4] | <input checked="" type="checkbox"/> - FOREST, SWAMP [3]     | <input type="checkbox"/> - CONSERVATION TILLAGE [1]  |                    |
| <input type="checkbox"/> - MODERATE 10-50m [3]       | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]           | <input type="checkbox"/> - URBAN OR INDUSTRIAL [0]   |                    |
| <input type="checkbox"/> - NARROW 5-10 m [2]         | <input type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> - OPEN PASTURE, ROWCROP [0] |                    |
| <input type="checkbox"/> - VERY NARROW <5 m [1]      | <input type="checkbox"/> - FENCED PASTURE [1]               | <input type="checkbox"/> - MINING/CONSTRUCTION [0]   |                    |

COMMENTS:

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

|                                                  |                                                                     |                                                              |                    |
|--------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------|--------------------|
| MAX. DEPTH (Check 1 ONLY!)                       | MORPHOLOGY (Check 1 or 2 & AVERAGE)                                 | CURRENT VELOCITY [ POOLS & RIFFLES! ] (Check All That Apply) | Pool/Current       |
| <input type="checkbox"/> - >1m [6]               | <input checked="" type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> - EDDIES [1]                        | <b>5</b><br>Max 12 |
| <input checked="" type="checkbox"/> - 0.7-1m [4] | <input checked="" type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> - FAST [1]                          |                    |
| <input type="checkbox"/> - 0.4-0.7m [2]          | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> - MODERATE [1]                      |                    |
| <input type="checkbox"/> - 0.2- 0.4m [1]         |                                                                     | <input checked="" type="checkbox"/> - SLOW [1]               |                    |
| <input type="checkbox"/> - < 0.2m [POOL=0]       | COMMENTS:                                                           | <input type="checkbox"/> - TORRENTIAL [-1]                   |                    |

CHECK ONE OR CHECK 2 AND AVERAGE

|                                                              |                                         |                                                                 |                                           |                    |
|--------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|-------------------------------------------|--------------------|
| RIFFLE DEPTH                                                 | RUN DEPTH                               | RIFFLE/RUN SUBSTRATE                                            | RIFFLE/RUN EMBEDDEDNESS                   | Riffle/Run         |
| <input type="checkbox"/> - Best Areas >10 cm [2]             | <input type="checkbox"/> - MAX > 50 [2] | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> - NONE [2]       | <b>0</b><br>Max 8  |
| <input type="checkbox"/> - Best Areas 5-10 cm [1]            | <input type="checkbox"/> - MAX < 50 [1] | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> - LOW [1]        |                    |
| <input type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0]      |                                         | <input type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> - MODERATE [0]   |                    |
| COMMENTS: <u>DEEP, SLOW MOVING CHANNEL, NO RIFFLES NOTED</u> |                                         | <input checked="" type="checkbox"/> - NO RIFFLE [Metric=0]      | <input type="checkbox"/> - EXTENSIVE [-1] | <b>6</b><br>Max 10 |

6] GRADIENT (ft/mi): 3.9 DRAINAGE AREA (sq.mi.): 26.1

%POOL:  %GLIDE: 100

%RIFFLE:  %RUN:

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                                                                                     |                                                                                    |               |                    |                      |                    |                      |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------|--------------------|----------------------|--------------------|----------------------|
| <input style="width: 100%; height: 50px;" type="text"/><br>Subjective Rating (1-10) | <input style="width: 100%; height: 50px;" type="text"/><br>Aesthetic Rating (1-10) | Gear: _____   | Distance: _____    | Water Clarity: _____ | Water Stage: _____ | Canopy -% Open _____ |
| First Sampling Pass _____                                                           |                                                                                    |               |                    |                      |                    |                      |
| Stream Measurements:                                                                |                                                                                    |               |                    |                      |                    |                      |
| Average Width                                                                       | Average Depth                                                                      | Maximum Depth | Av. Bankfull Width | Bankfull Depth       | Mean W/D Ratio     | Bankfull Max Depth   |
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***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 8.4  
Stream Segment Location: At Keller Street  
QHEI Score: Not Applicable

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FIELD NOTES: 10 SEP 2002

This stretch of French Creek is located at the terminus of Keller Street. No QHEI stream data was taken due to the overabundance of ducks and chickens in and around the creek channel and lack of suitable access. Narrow riparian buffers were located on both banks and dominated by eastern cottonwood, boxelder, silver maple, American basswood, and black walnut. Wider buffers are apparent further downstream (>100'). A retaining wall is located at the end of Keller and along the residential lots. A footbridge is used by the last residence on the south side of Keller to access several sheds/chicken coops on the southwest side of the creek. Feces from these birds may be a significant source of contamination

PHOTOS:



1) French Creek 8.4 – Facing downstream from the end of Keller Street



2) French Creek 8.4 - Facing upstream from the end of Keller Street

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 8.9  
Stream Segment Location: At Jaycox Road (mouth of "Schwartz" Ditch)  
QHEI Score: 42

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**FIELD NOTES: 10 SEP 2002**

This stretch of French Creek runs adjacent to Jaycox Road between Riegelsberger Road and the outlet of 'Schwartz' Ditch. It appears Schwartz Ditch may be a significant source of siltation. The east bank of the creek (10-15' wide) provides a narrow buffer to Jaycox Road, which parallels the creek. The west bank is also a narrow (20 +/-) riparian buffer to residential development and fallow agricultural land. Dominant species noted include: poison ivy, black nightshade, stinging nettle, raspberry bushes, boxelder, green ash, black willow, and multiflora rose. The creek channel is generally 20' wide with depths ranging from 5-50 cm, although a deep pool (80 cm) is present. The substrate is dominated by sand and gravel with lesser amounts of cobbles and silt. Minnows and frogs were noted. Algae was also noted, indicating eutrophication. Erosion was noted along both banks (15' +/-). Some demolition debris was noted along the east bank (concrete, rebar). A culvert from under Jaycox road empties 15' above the creek channel and may cause minor erosion. It does not appear this culvert transfers significant water.

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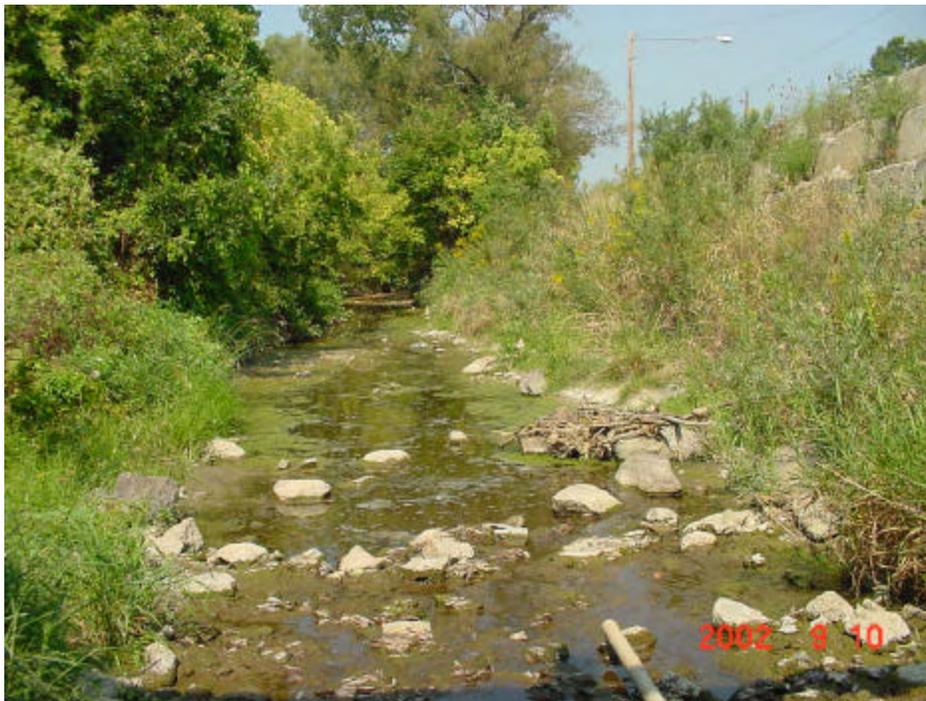
**PHOTOS:**



1) French Creek 8.9 – Facing downstream from Schwartz Ditch



2) French Creek 8.9 - Facing upstream from Schwartz Ditch



4) French Creek 8.9 – Facing downstream from Riegelsberger

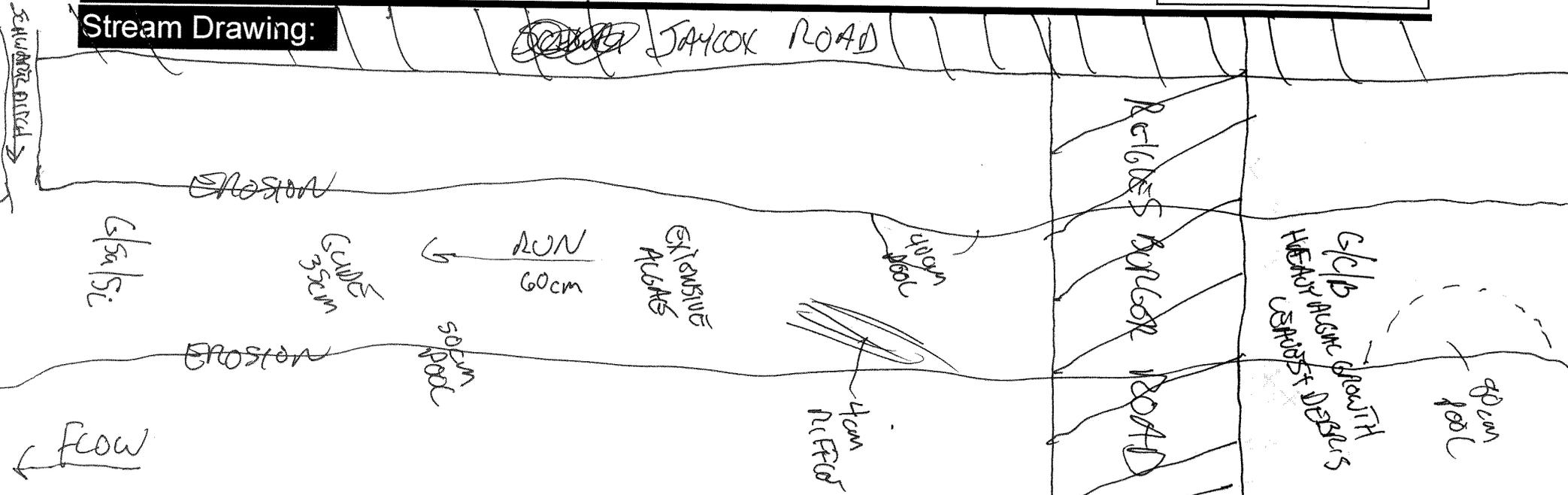


Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                                                                                                                   |                         |                      |                      |                    |                      |           |                    |                       |                 |
|-------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|----------------------|--------------------|----------------------|-----------|--------------------|-----------------------|-----------------|
|                                                                                                                   | Gear: _____             | Distance: _____      | Water Clarity: _____ | Water Stage: _____ | Canopy -% Open _____ |           |                    |                       |                 |
| First Sampling Pass                                                                                               | _____                   | _____                | _____                | _____              | _____                |           |                    |                       |                 |
| Subjective Rating (1-10)                                                                                          | Aesthetic Rating (1-10) | Stream Measurements: |                      |                    |                      |           |                    |                       |                 |
| Gradient:<br><input type="checkbox"/> - Low, <input type="checkbox"/> - Moderate, <input type="checkbox"/> - High | Average Width           | Average Depth        | Maximum Depth        | Av. Bankfull Width | Bankfull Mean Depth  | W/D Ratio | Bankfull Max Depth | Floodprone Area Width | Entrench. Ratio |
|                                                                                                                   |                         |                      |                      |                    |                      |           |                    |                       |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 10.4  
Stream Segment Location: At Mills Road  
QHEI Score: 27

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FIELD NOTES: 11 SEP 2002

This portion of French Creek is located upstream (south) of Mills Road, as it flows through Murial Village, a condominium complex. The creek has been severely altered in this area. The 25' wide, 0-30 cm. deep channel is the result of reshaping. The substrate is dominated by sand, silt and gravel. There is no buffer on either side (mowed lawn to condos). Geese, ducks, and minnows were noted in the pools. There is great restoration potential in this area.

PHOTOS:

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1) French Creek 10.4 – Facing upstream from Mills Road



2) French Creek 10.4 – Facing downstream toward bridge



3) French Creek 10.4 – Facing upstream from end of sample



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 27

River Code: RM: 10.4 Stream: FRENCH CREEK  
 Date: 9/11/02 Location: AT MILLS ROAD  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                                                                | POOL RIFFLE                                                      | POOL RIFFLE                                              | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                   |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------|------------------|-----------------------------------------------------|
| <input type="checkbox"/> BLDR /SLBS [10] _____                                      | <input type="checkbox"/> GRAVEL [7] <u>20</u> <u>20</u>          | Check ONE (OR 2 & AVERAGE)                               |                  | Check ONE (OR 2 & AVERAGE)                          |
| <input type="checkbox"/> BOULDER [9] _____                                          | <input checked="" type="checkbox"/> SAND [6] <u>40</u> <u>40</u> | <input type="checkbox"/> LIMESTONE [1] _____             | SILT:            | <input checked="" type="checkbox"/> SILT HEAVY [-2] |
| <input type="checkbox"/> COBBLE [8] _____                                           | <input type="checkbox"/> BEDROCK [5] _____                       | <input type="checkbox"/> TILLS [1] _____                 |                  | <input type="checkbox"/> SILT MODERATE [-1]         |
| <input type="checkbox"/> HARDPAN [4] _____                                          | <input type="checkbox"/> DETRITUS [3] _____                      | <input type="checkbox"/> WETLANDS [0] _____              |                  | <input type="checkbox"/> SILT NORMAL [0]            |
| <input type="checkbox"/> MUCK [2] _____                                             | <input type="checkbox"/> ARTIFICIAL [0] _____                    | <input type="checkbox"/> HARDPAN [0] _____               |                  | <input type="checkbox"/> SILT FREE [1]              |
| <input checked="" type="checkbox"/> SILT [2] <u>40</u> <u>40</u>                    | NOTE: Ignore Sludge Originating From Point Sources               | <input type="checkbox"/> SANDSTONE [0] EMBEDDED          |                  | <input checked="" type="checkbox"/> EXTENSIVE [-2]  |
| NUMBER OF SUBSTRATE TYPES: <input type="checkbox"/> 4 or More [2]                   |                                                                  | <input type="checkbox"/> RIP/RAP [0] _____               | NESS:            | <input type="checkbox"/> MODERATE [-1]              |
| (High Quality Only, Score 5 or >) <input checked="" type="checkbox"/> 3 or Less [0] |                                                                  | <input checked="" type="checkbox"/> LACUSTRINE [0] _____ |                  | <input type="checkbox"/> NORMAL [0]                 |
| COMMENTS: _____                                                                     |                                                                  | <input type="checkbox"/> SHALE [-1] _____                |                  | <input type="checkbox"/> NONE [1]                   |
|                                                                                     |                                                                  | <input type="checkbox"/> COAL FINES [-2] _____           |                  |                                                     |

Substrate  
4  
 Max 20

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| (Structure)                                                            | TYPE: Score All That Occur                       | AMOUNT: (Check ONLY One or check 2 and AVERAGE) |
|------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------|
| <input type="checkbox"/> UNDERCUT BANKS [1] _____                      | <input type="checkbox"/> POOLS > 70 cm [2] _____ | <input type="checkbox"/> EXTENSIVE > 75% [11]   |
| <input type="checkbox"/> OVERHANGING VEGETATION [1] _____              | <input type="checkbox"/> ROOTWADS [1] _____      | <input type="checkbox"/> MODERATE 25-75% [7]    |
| <input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1] _____ | <input type="checkbox"/> BOULDERS [1] _____      | <input type="checkbox"/> SPARSE 5-25% [3]       |
| <input type="checkbox"/> ROOTMATS [1] _____                            | COMMENTS: _____                                  | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |

Cover  
2  
 Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

| SINUOSITY                                          | DEVELOPMENT                                        | CHANNELIZATION                                                      | STABILITY                                         | MODIFICATIONS/OTHER                                           |
|----------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------|
| <input type="checkbox"/> HIGH [4] _____            | <input type="checkbox"/> EXCELLENT [7] _____       | <input type="checkbox"/> NONE [6] _____                             | <input type="checkbox"/> HIGH [3] _____           | <input type="checkbox"/> SNAGGING _____                       |
| <input type="checkbox"/> MODERATE [3] _____        | <input type="checkbox"/> GOOD [5] _____            | <input type="checkbox"/> RECOVERED [4] _____                        | <input type="checkbox"/> MODERATE [2] _____       | <input checked="" type="checkbox"/> RELOCATION _____          |
| <input type="checkbox"/> LOW [2] _____             | <input type="checkbox"/> FAIR [3] _____            | <input type="checkbox"/> RECOVERING [3] _____                       | <input checked="" type="checkbox"/> LOW [1] _____ | <input checked="" type="checkbox"/> CANOPY REMOVAL _____      |
| <input checked="" type="checkbox"/> NONE [1] _____ | <input checked="" type="checkbox"/> POOR [1] _____ | <input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1] _____ |                                                   | <input type="checkbox"/> DREDGING _____                       |
|                                                    |                                                    |                                                                     |                                                   | <input type="checkbox"/> LEVEED _____                         |
|                                                    |                                                    |                                                                     |                                                   | <input type="checkbox"/> BANK SHAPING _____                   |
|                                                    |                                                    |                                                                     |                                                   | <input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS _____ |

Channel  
4  
 Max 20

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

| RIPARIAN WIDTH                                      |                                                                            | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)            |                                                        | BANK EROSION                                           |  |
|-----------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|--|
| L R (Per Bank)                                      | L R (Most Predominant Per Bank)                                            | L R                                                      | L R                                                    | L R (Per Bank)                                         |  |
| <input type="checkbox"/> WIDE > 50m [4] _____       | <input type="checkbox"/> FOREST, SWAMP [3] _____                           | <input type="checkbox"/> CONSERVATION TILLAGE [1] _____  | <input type="checkbox"/> URBAN OR INDUSTRIAL [0] _____ | <input type="checkbox"/> NONE/LITTLE [3] _____         |  |
| <input type="checkbox"/> MODERATE 10-50m [3] _____  | <input type="checkbox"/> SHRUB OR OLD FIELD [2] _____                      | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] _____ | <input type="checkbox"/> MINING/CONSTRUCTION [0] _____ | <input checked="" type="checkbox"/> MODERATE [2] _____ |  |
| <input type="checkbox"/> NARROW 5-10 m [2] _____    | <input checked="" type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] _____ |                                                          |                                                        | <input type="checkbox"/> HEAVY/SEVERE [1] _____        |  |
| <input type="checkbox"/> VERY NARROW <5 m [1] _____ | <input type="checkbox"/> FENCED PASTURE [1] _____                          |                                                          |                                                        |                                                        |  |
| <input checked="" type="checkbox"/> NONE [0] _____  |                                                                            |                                                          |                                                        |                                                        |  |

Riparian  
3  
 Max 10

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                             | MORPHOLOGY (Check 1 or 2 & AVERAGE)                                     | CURRENT VELOCITY [ POOLS & RIFFLES! ] (Check All That Apply) |
|--------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------|
| <input type="checkbox"/> >1m [6] _____                 | <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] _____ | <input type="checkbox"/> EDDIES [1] _____                    |
| <input type="checkbox"/> 0.7-1m [4] _____              | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] _____            | <input type="checkbox"/> FAST [1] _____                      |
| <input type="checkbox"/> 0.4-0.7m [2] _____            | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0] _____               | <input type="checkbox"/> MODERATE [1] _____                  |
| <input checked="" type="checkbox"/> 0.2-0.4m [1] _____ | COMMENTS: _____                                                         | <input checked="" type="checkbox"/> SLOW [1] _____           |
| <input type="checkbox"/> < 0.2m [POOL=0] _____         |                                                                         | <input type="checkbox"/> TORRENTIAL [-1] _____               |
|                                                        |                                                                         | <input type="checkbox"/> INTERSTITIAL [-1] _____             |
|                                                        |                                                                         | <input type="checkbox"/> INTERMITTENT [-2] _____             |
|                                                        |                                                                         | <input type="checkbox"/> VERY FAST [1] _____                 |

Pool/Current  
4  
 Max 12

| CHECK ONE OR CHECK 2 AND AVERAGE                                       |                                                        |                                                                            |                                                          |
|------------------------------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------|
| RIFFLE DEPTH                                                           | RUN DEPTH                                              | RIFFLE/RUN SUBSTRATE                                                       | RIFFLE/RUN EMBEDDEDNESS                                  |
| <input type="checkbox"/> Best Areas >10 cm [2] _____                   | <input type="checkbox"/> MAX > 50 [2] _____            | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] _____          | <input type="checkbox"/> NONE [2] _____                  |
| <input type="checkbox"/> Best Areas 5-10 cm [1] _____                  | <input checked="" type="checkbox"/> MAX < 50 [1] _____ | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] _____        | <input type="checkbox"/> LOW [1] _____                   |
| <input checked="" type="checkbox"/> Best Areas < 5 cm [RIFFLE=0] _____ |                                                        | <input checked="" type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0] _____ | <input type="checkbox"/> MODERATE [0] _____              |
| COMMENTS: _____                                                        |                                                        | <input type="checkbox"/> NO RIFFLE [Metric=0] _____                        | <input checked="" type="checkbox"/> EXTENSIVE [-1] _____ |

Riffle/Run  
0  
 Max 8  
 Gradient  
10  
 Max 10

6] GRADIENT (ft/mi): 7.6 DRAINAGE AREA (sq.mi.): 15.8  
 %POOL: 30 %GLIDE: 60  
 %RIFFLE: 10 %RUN: -

Is Sampling Reach Representative of the Stream (Y/N)\_\_\_ If Not, Explain:

\_\_\_\_\_

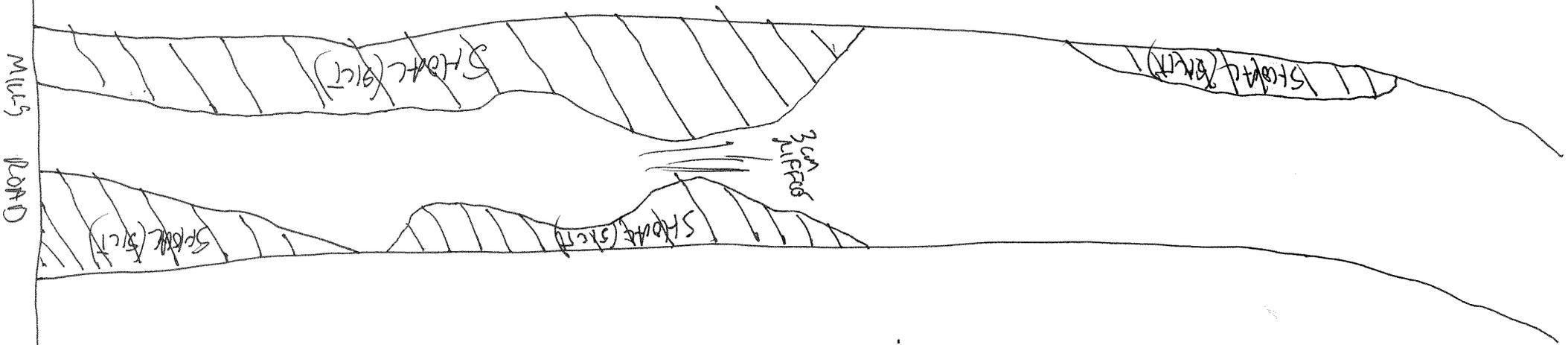
\_\_\_\_\_

\_\_\_\_\_

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                                                      |                                                     |                           |                 |                      |                     |                      |                                                                                                                |                       |                 |
|------------------------------------------------------|-----------------------------------------------------|---------------------------|-----------------|----------------------|---------------------|----------------------|----------------------------------------------------------------------------------------------------------------|-----------------------|-----------------|
|                                                      |                                                     | Gear: _____               | Distance: _____ | Water Clarity: _____ | Water Stage: _____  | Canopy -% Open _____ |                                                                                                                |                       |                 |
| <input type="checkbox"/><br>Subjective Rating (1-10) | <input type="checkbox"/><br>Aesthetic Rating (1-10) | First Sampling Pass _____ |                 |                      |                     |                      |                                                                                                                |                       |                 |
| Stream Measurements:                                 |                                                     |                           |                 |                      |                     |                      |                                                                                                                |                       |                 |
|                                                      | Average Width                                       | Average Depth             | Maximum Depth   | Av. Bankfull Width   | Bankfull Mean Depth | W/D Ratio            | Bankfull Max Depth                                                                                             | Floodprone Area Width | Entrench. Ratio |
|                                                      |                                                     |                           |                 |                      |                     |                      |                                                                                                                |                       |                 |
|                                                      |                                                     |                           |                 |                      |                     |                      | Gradient: <input type="checkbox"/> - Low, <input type="checkbox"/> - Moderate, <input type="checkbox"/> - High |                       |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 10.7  
Stream Segment Location: At Chesterfield Avenue  
QHEI Score: 40

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FIELD NOTES: 11 SEP 2002

This portion of French Creek is located south (upstream) of Chesterfield Ave. The 15-18' wide, 0-25 cm. deep channel has 3-6' banks and a substrate of gravel, sand, and silt. Minnows and algae were noted. The section is a straight, incised channel between residential developments with a retention wall on the east bank. The 5' wide, vegetated buffer is dominated by red raspberry, boxelder, perennial ryegrass, thistle and Canada goldenrod.

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PHOTOS:



1) French Creek 10.7 – Facing south (upstream)



2) French Creek 10.7 - Facing downstream



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **40**

River Code: RM: 10.7 Stream: FRENCH CREEK  
Date: 9/11/02 Location: AT CHESTERFIELD AVENUE  
Scorers Full Name: JAY MILLOR Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)  
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY  
 -BLDR /SLBS[10]  -GRAVEL [7] 50 50 Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)  
 -BOULDER [9]  -SAND [6] 30 30  -LIMESTONE [1] SILT:  - SILT HEAVY [-2]  
 -COBBLE [8]  -BEDROCK[5]  -TILLS [1]  -SILT MODERATE [-1] Substrate  
 -HARDPAN [4]  -DETRITUS[3]  -WETLANDS[0]  -SILT NORMAL [0]  11  
 -MUCK [2]  -ARTIFICIAL[0]  -HARDPAN [0]  -SILT FREE [1] Max 20  
 -SILT [2] 20 20 NOTE: Ignore Sludge Originating From Point Sources  -EXTENSIVE [-2]  
NUMBER OF SUBSTRATE TYPES:  -4 or More [2]  -3 or Less [0]  -MODERATE [-1]  
 -RIP/RAP [0] NESS:  -NORMAL [0]  
 -LACUSTRINE [0]  -SHALE [-1]  
 -COAL FINES [-2]

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) AMOUNT: (Check ONLY One or check 2 and AVERAGE) Cover  
(Structure) TYPE: Score All That Occur  
0 UNDERCUT BANKS [1] 0 POOLS > 70 cm [2] 0 OXBOWS, BACKWATERS [1]  - EXTENSIVE > 75% [11]  4  
1 OVERHANGING VEGETATION [1] 0 ROOTWADS [1] 0 AQUATIC MACROPHYTES [1]  - MODERATE 25-75% [7]  
2 SHALLOWS (IN SLOW WATER) [1] 0 BOULDERS [1] 0 LOGS OR WOODY DEBRIS [1]  - SPARSE 5-25% [3] Max 20  
1 ROOTMATS [1] COMMENTS:  - NEARLY ABSENT < 5%[1]

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE ) Channel  
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER  
 - HIGH [4]  - EXCELLENT [7]  - NONE [6]  - HIGH [3]  - SNAGGING  - IMPOUND.  
 - MODERATE [3]  - GOOD [5]  - RECOVERED [4]  - MODERATE [2]  - RELOCATION  - ISLANDS  
 - LOW [2]  - FAIR [3]  - RECOVERING [3]  - LOW [1]  - CANOPY REMOVAL  - LEVEED  
 - NONE [1]  - POOR [1]  - RECENT OR NO RECOVERY [1]  - DREDGING  - BANK SHAPING  
 - ONE SIDE CHANNEL MODIFICATIONS  5  
Max 20

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream  
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION Riparian  
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)  
 - WIDE > 50m [4]  - FOREST, SWAMP [3]  - CONSERVATION TILLAGE [1]  - NONE/LITTLE [3]  5  
 - MODERATE 10-50m [3]  - SHRUB OR OLD FIELD [2]  - URBAN OR INDUSTRIAL [0]  - MODERATE [2] Max 10  
 - NARROW 5-10 m [2]  - RESIDENTIAL, PARK, NEW FIELD [1]  - OPEN PASTURE, ROWCROP [0]  - HEAVY/SEVERE [1]  
 - VERY NARROW <5 m[1]  - FENCED PASTURE [1]  - MINING/CONSTRUCTION [0]  
 - NONE [0]  
COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY Pool/Current  
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [ POOLS & RIFFLES! ]  
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)  
 - >1m [6]  - POOL WIDTH > RIFFLE WIDTH [2]  - EDDIES[1]  - TORRENTIAL[-1]  4  
 - 0.7-1m [4]  - POOL WIDTH = RIFFLE WIDTH [1]  - FAST[1]  - INTERSTITIAL[-1] Max 12  
 - 0.4-0.7m [2]  - POOL WIDTH < RIFFLE W. [0]  - MODERATE [1]  - INTERMITTENT[-2]  
 - 0.2- 0.4m [1]  - SLOW [1]  - VERY FAST[1]  
 - < 0.2m [POOL=0] COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE Riffle/Run  
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS  
 - Best Areas >10 cm [2]  - MAX > 50 [2]  - STABLE (e.g., Cobble, Boulder) [2]  - NONE [2]  1  
 - Best Areas 5-10 cm[1]  - MAX < 50[1]  - MOD. STABLE (e.g., Large Gravel) [1]  - LOW [1] Max 8  
 - Best Areas < 5 cm [RIFFLE=0]  - UNSTABLE (Fine Gravel, Sand) [0]  - MODERATE [0]  - EXTENSIVE [-1] Gradient  
COMMENTS:  - NO RIFFLE [Metric=0]  10  
Max 10

6) GRADIENT (ft/mi): 8.5 DRAINAGE AREA (sq.mi.): 11.1 %POOL: 30 %GLIDE: 35  
%RIFFLE: 15 %RUN: 20

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:

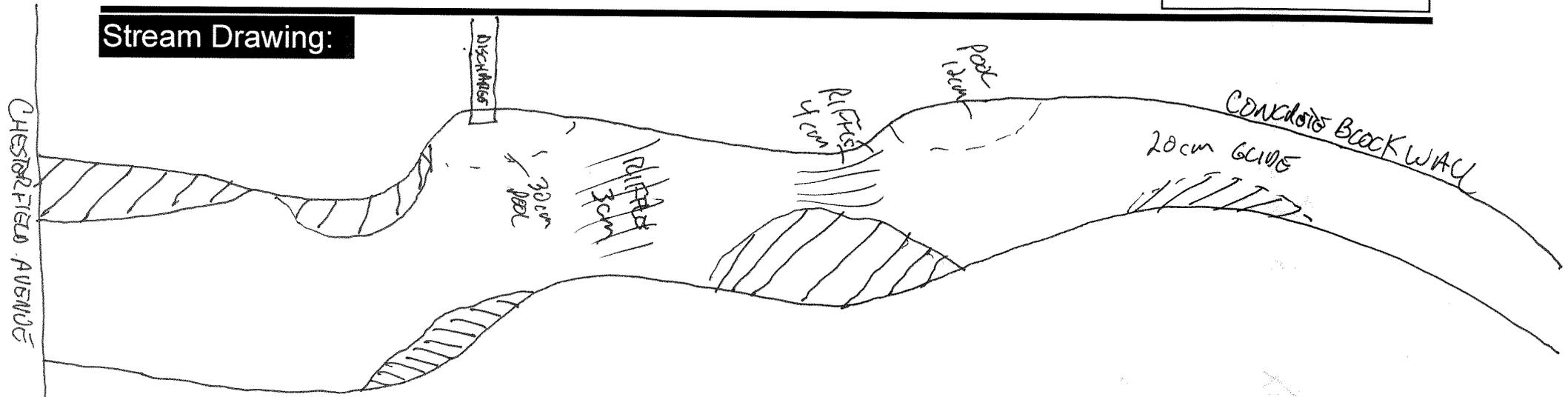
- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

| Stream Measurements: |               |               |                    |                |                |                    |                 |                 |       |
|----------------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|-------|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Width | Ratio |
|                      |               |               |                    |                |                |                    |                 |                 |       |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 11.8  
Stream Segment Location: At Mildred Street  
QHEI Score: Not Applicable

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FIELD NOTES: 12 SEP 2002

No QHEI data was taken at this portion of French Creek located upstream (south) of Mildred Street due to access issues. The creek is 15' +/- wide and approximately 20 cm deep at the bridge with a substrate of silt, sand, gravel, boulders, and cobbles. The 10-15' buffers appeared to be dominated by boxelder and raspberry bushes.

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PHOTOS:



1) French Creek 11.8 – Facing upstream from bridge

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 12.4  
Stream Segment Location: At Center Ridge Road  
QHEI Score: 45.5

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FIELD NOTES: 12 SEP 2002

This portion of French Creek is located upstream (south) of Center Ridge Road. The 15' banks provide a 10-25' buffer to the commercial/industrial/municipal development. The vegetated buffer contains: boxelder, sugar maple, tartarian honeysuckle, chokecherry, multiflora rose, mulberry, English ivy, green ash, American basswood, catalpa, spotted touch-me-not and riverbank grape. The buffers are 25' +/- on the east bank and 10' +/- wide on the west bank. The substrate in the 6-12' wide, 5-25 cm. deep channel is comprised of silt and sand substrates, with a mix of boulders, cobbles, and gravel. Frogs and minnows were noted. A series of culverts and PVC drain pipes discharge storm water from the properties on either side. Most notable is a rust-colored seepage coming from the west bank. It appears that this may be a source of contamination. This discharge has created rust-colored sediment in the streambed.

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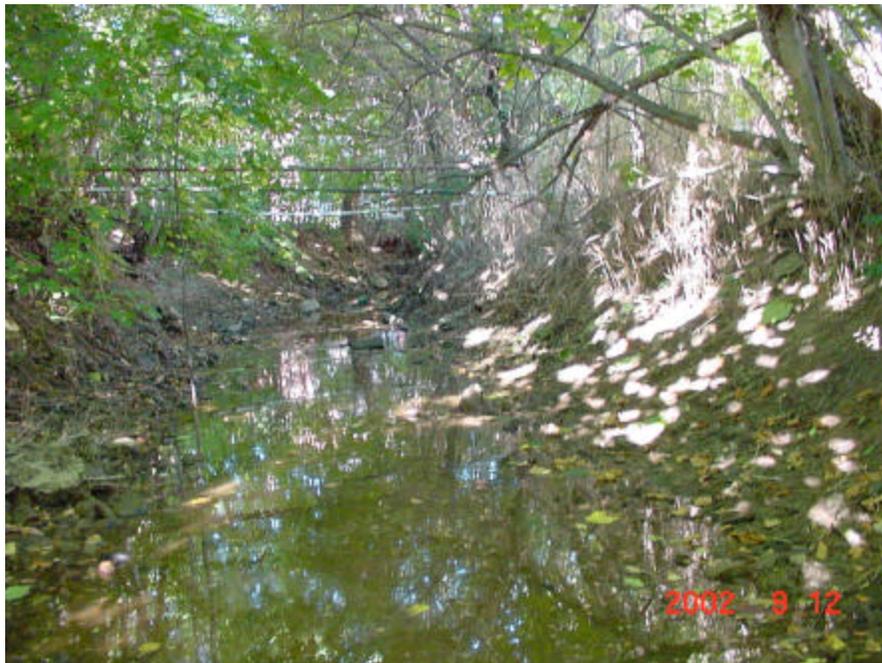
PHOTOS:



1) French Creek 12.4 – Facing upstream from bridge



2) French Creek 12.4 – Contamination seep on west bank



3) French Creek 12.4 – Facing downstream

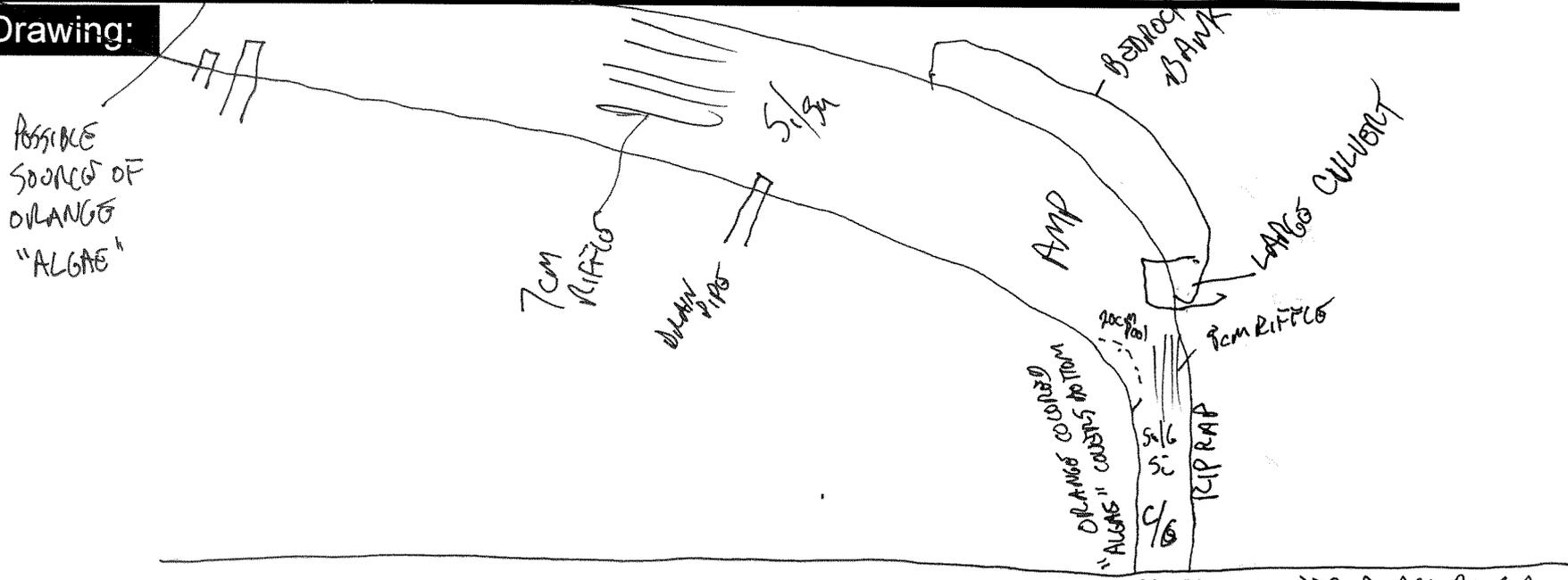


Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                                                                                                                  |                                                                                                                 |                           |                 |                      |                     |                      |                    |                 |                 |       |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------|-----------------|----------------------|---------------------|----------------------|--------------------|-----------------|-----------------|-------|
|                                                                                                                  |                                                                                                                 | Gear: _____               | Distance: _____ | Water Clarity: _____ | Water Stage: _____  | Canopy -% Open _____ |                    |                 |                 |       |
| <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Subjective Rating (1-10) | <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Aesthetic Rating (1-10) | First Sampling Pass _____ |                 |                      |                     |                      |                    |                 |                 |       |
| Stream Measurements:                                                                                             |                                                                                                                 |                           |                 |                      |                     |                      |                    |                 |                 |       |
|                                                                                                                  | Average Width                                                                                                   | Average Depth             | Maximum Depth   | Av. Bankfull Width   | Bankfull Mean Depth | W/D Ratio            | Bankfull Max Depth | Floodprone Area | Entrench. Width | Ratio |
|                                                                                                                  |                                                                                                                 |                           |                 |                      |                     |                      |                    |                 |                 |       |
| Gradient: <input type="checkbox"/> - Low, <input type="checkbox"/> - Moderate, <input type="checkbox"/> - High   |                                                                                                                 |                           |                 |                      |                     |                      |                    |                 |                 |       |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

Yes/No **CENTER RIDGE ROAD**

Is Stream Ephemeral (no pools, totally dry or only damp spots)?

Is there water upstream? How Far: \_\_\_\_\_

Is There Water Close Downstream? How Far: \_\_\_\_\_

Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 12.7  
Stream Segment Location: At Root Road  
QHEI Score: 45

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FIELD NOTES: 12 SEP 2002

This portion of French Creek is located upstream (east) of Root Road. Two branches converge at the eastern extent of the sample area. This 10' wide, 15 cm. deep portion of creek has a 10' buffer on both banks, with commercial development to the north and residential development to the south. The substrate is dominated by gravel, sand and silt with lesser amounts of boulders and cobbles. Water milfoil and duckweed were present in portions of the channel. The vegetative buffers contained crab apple, silver maple, boxelder, silky dogwood, weeping willow, gray-stemmed dogwood, green ash and chokecherry. Minnows were noted in the pools. A PVC drain discharges from the residential area to the south.

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PHOTOS:



1) French Creek 12.7 – Facing upstream from bridge



2) French Creek 12.7 – Facing downstream from end



3) French Creek 12.7 – Facing east along north branch



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **45**

River Code: RM: 12.7 Stream: FRENCH CREEK  
Date: 9/12/02 Location: AT ROOT ROAD  
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

|                                                                   |                                                                   |                                                     |                  |                                                         |
|-------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------|------------------|---------------------------------------------------------|
| TYPE                                                              | POOL RIFFLE                                                       | POOL RIFFLE                                         | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                       |
| <input type="checkbox"/> -BLDR /SLBS[10] _____                    | <input type="checkbox"/> -GRAVEL [7] <u>15</u> <u>35</u>          | Check ONE (OR 2 & AVERAGE)                          |                  | Check ONE (OR 2 & AVERAGE)                              |
| <input type="checkbox"/> -BOULDER [9] <u>5</u>                    | <input checked="" type="checkbox"/> -SAND [6] <u>40</u> <u>30</u> | <input type="checkbox"/> -LIMESTONE [1]             | SILT:            | <input type="checkbox"/> -SILT HEAVY [-2]               |
| <input type="checkbox"/> -COBBLE [8] <u>5</u> <u>10</u>           | <input type="checkbox"/> -BEDROCK[5] _____                        | <input checked="" type="checkbox"/> -TILLS [1]      |                  | <input checked="" type="checkbox"/> -SILT MODERATE [-1] |
| <input type="checkbox"/> -HARDPAN [4] _____                       | <input type="checkbox"/> -DETRITUS[3] _____                       | <input type="checkbox"/> -WETLANDS[0]               |                  | <input type="checkbox"/> -SILT NORMAL [0]               |
| <input type="checkbox"/> -MUCK [2] _____                          | <input type="checkbox"/> -ARTIFICIAL[0] _____                     | <input type="checkbox"/> -HARDPAN [0] _____         |                  | <input type="checkbox"/> -SILT FREE [1]                 |
| <input checked="" type="checkbox"/> -SILT [2] <u>40</u> <u>30</u> | NOTE: Ignore Sludge Originating From Point Sources                | <input type="checkbox"/> -SANDSTONE [0] EMBEDDED    |                  | <input type="checkbox"/> -EXTENSIVE [-2]                |
|                                                                   |                                                                   | <input type="checkbox"/> -RIP/RAP [0] NESS:         |                  | <input checked="" type="checkbox"/> -MODERATE [-1]      |
|                                                                   |                                                                   | <input checked="" type="checkbox"/> -LACUSTRINE [0] |                  | <input type="checkbox"/> -NORMAL [0]                    |
|                                                                   |                                                                   | <input type="checkbox"/> -SHALE [-1]                |                  | <input type="checkbox"/> -NONE [1]                      |
|                                                                   |                                                                   | <input type="checkbox"/> -COAL FINES [-2]           |                  |                                                         |

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >)  4 or More [2]  3 or Less [0]

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) AMOUNT: (Check ONLY One or check 2 and AVERAGE)

|                                       |                            |                                   |                                                                                                                                                                                                      |
|---------------------------------------|----------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (Structure)                           | TYPE: Score All That Occur |                                   | Cover                                                                                                                                                                                                |
| <u>2</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <u>0</u> OXBOWS, BACKWATERS [1]   | <input type="checkbox"/> - EXTENSIVE > 75% [11]<br><input type="checkbox"/> - MODERATE 25-75% [7]<br><input type="checkbox"/> - SPARSE 5-25% [3]<br><input type="checkbox"/> - NEARLY ABSENT < 5%[1] |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <u>2</u> AQUATIC MACROPHYTES [1]  |                                                                                                                                                                                                      |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>1</u> BOULDERS [1]      | <u>2</u> LOGS OR WOODY DEBRIS [1] |                                                                                                                                                                                                      |
| <u>2</u> ROOTMATS [1]                 | COMMENTS: _____            |                                   |                                                                                                                                                                                                      |

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

|                                               |                                                |                                                      |                                               |                                                                         |                                                                                                                                                                                                                                                                          |
|-----------------------------------------------|------------------------------------------------|------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SINUOSITY                                     | DEVELOPMENT                                    | CHANNELIZATION                                       | STABILITY                                     | MODIFICATIONS/OTHER                                                     | Channel                                                                                                                                                                                                                                                                  |
| <input type="checkbox"/> - HIGH [4]           | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                  | <input type="checkbox"/> - HIGH [3]           | <input type="checkbox"/> - SNAGGING <input type="checkbox"/> - IMPOUND. | <input type="checkbox"/> - ISLANDS<br><input checked="" type="checkbox"/> - CANOPY REMOVAL <input type="checkbox"/> - LEVEED<br><input type="checkbox"/> - DREDGING <input type="checkbox"/> - BANK SHAPING<br><input type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS |
| <input type="checkbox"/> - MODERATE [3]       | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]             | <input type="checkbox"/> - MODERATE [2]       | <input checked="" type="checkbox"/> - RELOCATION                        |                                                                                                                                                                                                                                                                          |
| <input checked="" type="checkbox"/> - LOW [2] | <input type="checkbox"/> - FAIR [3]            | <input checked="" type="checkbox"/> - RECOVERING [3] | <input checked="" type="checkbox"/> - LOW [1] |                                                                         |                                                                                                                                                                                                                                                                          |
| <input type="checkbox"/> - NONE [1]           | <input checked="" type="checkbox"/> - POOR [1] | <input type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                               |                                                                         |                                                                                                                                                                                                                                                                          |

COMMENTS: \_\_\_\_\_

4]. RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

|                                                            |                                                                        |                                                               |                                                    |
|------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------|
| RIPARIAN WIDTH                                             | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)                          | BANK EROSION                                                  | Riparian                                           |
| L R (Per Bank)                                             | L R (Most Predominant Per Bank)                                        | L R                                                           | L R (Per Bank)                                     |
| <input type="checkbox"/> - WIDE > 50m [4]                  | <input type="checkbox"/> - FOREST, SWAMP [3]                           | <input type="checkbox"/> - CONSERVATION TILLAGE [1]           | <input type="checkbox"/> - NONE/LITTLE [3]         |
| <input type="checkbox"/> - MODERATE 10-50m [3]             | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]                      | <input checked="" type="checkbox"/> - URBAN OR INDUSTRIAL [0] | <input checked="" type="checkbox"/> - MODERATE [2] |
| <input type="checkbox"/> - NARROW 5-10 m [2]               | <input checked="" type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> - OPEN PASTURE, ROWCROP [0]          | <input type="checkbox"/> - HEAVY/SEVERE [1]        |
| <input checked="" type="checkbox"/> - VERY NARROW <5 m [1] | <input type="checkbox"/> - FENCED PASTURE [1]                          | <input type="checkbox"/> - MINING/CONSTRUCTION [0]            |                                                    |
| <input type="checkbox"/> - NONE [0]                        |                                                                        |                                                               |                                                    |

COMMENTS: \_\_\_\_\_

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

|                                                    |                                                                     |                                                                                  |                                                                                                                                                                                         |
|----------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAX. DEPTH (Check 1 ONLY!)                         | MORPHOLOGY (Check 1 or 2 & AVERAGE)                                 | CURRENT VELOCITY (Check All That Apply)                                          | Pool/Current                                                                                                                                                                            |
| <input type="checkbox"/> - >1m [6]                 | <input checked="" type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> - EDDIES [1] <input type="checkbox"/> - TORRENTIAL [-1] | <input type="checkbox"/> - INTERSTITIAL [-1]<br><input type="checkbox"/> - INTERMITTENT [-2]<br><input checked="" type="checkbox"/> - SLOW [1] <input type="checkbox"/> - VERY FAST [1] |
| <input type="checkbox"/> - 0.7-1m [4]              | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> - FAST [1]                                              |                                                                                                                                                                                         |
| <input type="checkbox"/> - 0.4-0.7m [2]            | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> - MODERATE [1]                                          |                                                                                                                                                                                         |
| <input checked="" type="checkbox"/> - 0.2-0.4m [1] |                                                                     |                                                                                  |                                                                                                                                                                                         |
| <input type="checkbox"/> - < 0.2m [POOL=0]         | COMMENTS: _____                                                     |                                                                                  |                                                                                                                                                                                         |

CHECK ONE OR CHECK 2 AND AVERAGE

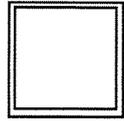
|                                                              |                                                    |                                                                        |                                     |                                                                                                                                       |
|--------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| RIFFLE DEPTH                                                 | RUN DEPTH                                          | RIFFLE/RUN SUBSTRATE                                                   | RIFFLE/RUN EMBEDDEDNESS             | Riffle/Run                                                                                                                            |
| <input type="checkbox"/> - Best Areas >10 cm [2]             | <input checked="" type="checkbox"/> - MAX > 50 [2] | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]          | <input type="checkbox"/> - NONE [2] | <input type="checkbox"/> - LOW [1]<br><input checked="" type="checkbox"/> - MODERATE [0]<br><input type="checkbox"/> - EXTENSIVE [-1] |
| <input checked="" type="checkbox"/> - Best Areas 5-10 cm [1] | <input checked="" type="checkbox"/> - MAX < 50 [1] | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1]        |                                     |                                                                                                                                       |
| <input type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0]      |                                                    | <input checked="" type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0] |                                     |                                                                                                                                       |
| COMMENTS: _____                                              |                                                    | <input type="checkbox"/> - NO RIFFLE [Metric=0]                        |                                     | Max 8<br>Gradient<br>Max 10                                                                                                           |

6] GRADIENT (ft/mi): 6.3 DRAINAGE AREA (sq.mi.): 8.9  
% POOL: 25 % GLIDE: 45  
% RIFFLE: 10 % RUN: 20

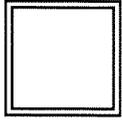
Is Sampling Reach Representative of the Stream (Y/N)\_\_\_ If Not, Explain:

Major Suspected Sources of Impacts (Check All That Apply):

- None
- Industrial
- WWTP
- Ag
- Livestock
- Silviculture
- Construction
- Urban Runoff
- CSOs
- Suburban Impacts
- Mining
- Channelization
- Riparian Removal
- Landfills
- Natural
- Dams
- Other Flow Alteration
- Other: \_\_\_\_\_



Subjective Rating (1-10)



Aesthetic Rating (1-10)

Gradient:

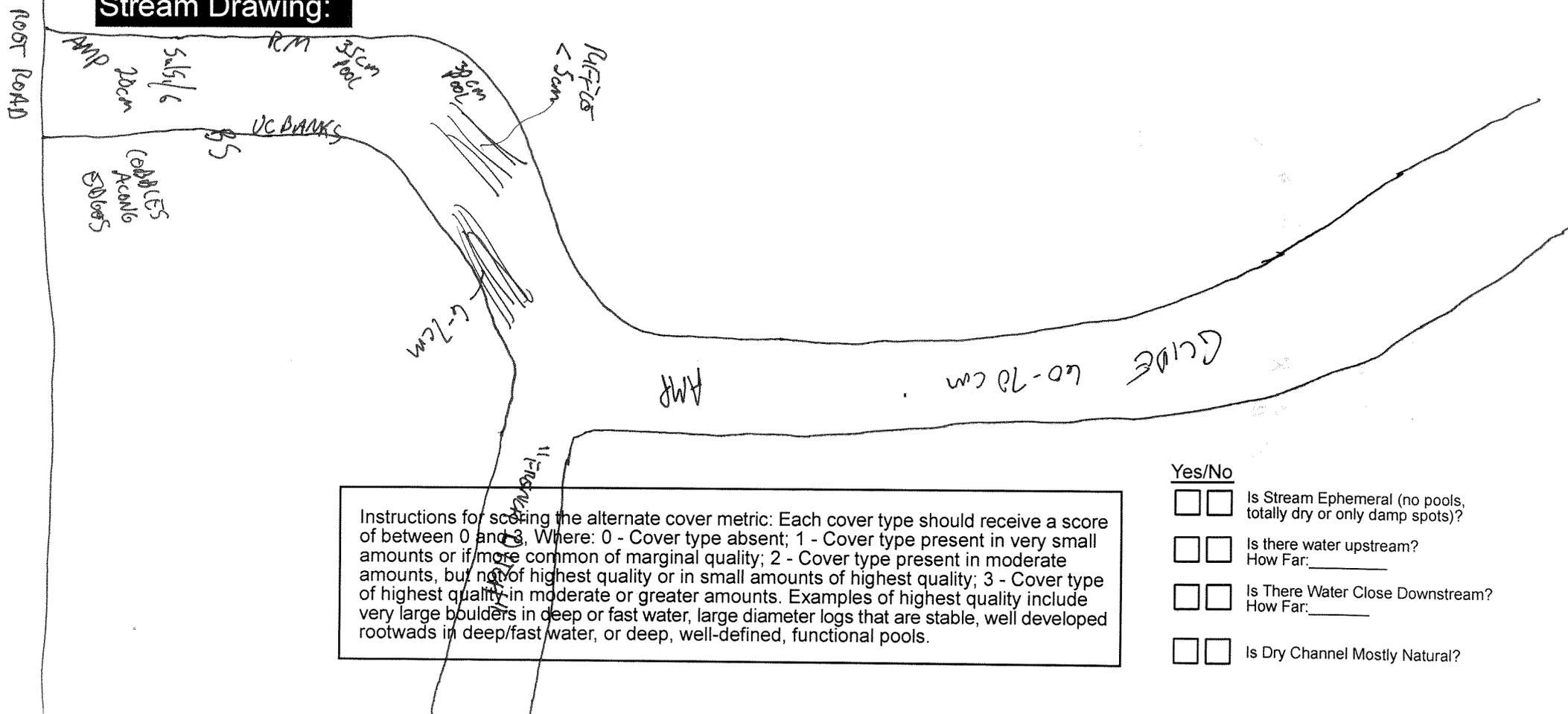
- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

| Stream Measurements: |               |               |                    |                     |           |                    |                 |                 |                 |
|----------------------|---------------|---------------|--------------------|---------------------|-----------|--------------------|-----------------|-----------------|-----------------|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Mean Depth | W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Width | Entrench. Ratio |
|                      |               |               |                    |                     |           |                    |                 |                 |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

Yes/No

- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
- Is there water upstream? How Far: \_\_\_\_\_
- Is There Water Close Downstream? How Far: \_\_\_\_\_
- Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Creek 14.1  
Stream Segment Location: Lear-Nagle Road  
QHEI Score: 34

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FIELD NOTES: 12 SEP 2002

This stretch of French Creek is located downstream (east) of Lear-Nagle Road. The 4-8' wide, 5-20 cm. deep channel contained minnows near the bridge (plunge pool). Emergent vegetation includes: spotted touch-me-not, reed canary grass, rice cutgrass and soft-stemmed bulrush were growing within the channel. The substrate is dominated by gravel, sand, cobbles, hardpan and silt. The 25' +/- wide north buffer is mostly herbaceous and has species including staghorn sumac, reed canary grass, canada goldenrod, Queen Anne's lace, teasel, multiflora rose, green briar and blackberry. The shrub/sapling covered south bank is a 25-50' buffer dominated by multiflora rose, boxelder, staghorn sumac, silky dogwood, blackcherry, eastern cottonwood, pin oak and tartarian honeysuckle.

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PHOTOS:



1) French Creek 14.1 – Facing downstream from bridge



2) French Creek 14.1 – Facing upstream



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **34**

River Code: RM: 14.1 Stream: FRENCH CREEK  
 Date: 9/12/02 Location: AT CORNER ANGLE ROAD  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

|                                                              |                                                                |                                                 |                  |                                                        |
|--------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------|------------------|--------------------------------------------------------|
| TYPE                                                         | POOL RIFFLE                                                    | POOL RIFFLE                                     | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                      |
| <input type="checkbox"/> BLDR /SLBS [10] _____               | <input checked="" type="checkbox"/> GRAVEL [7] _____ <u>25</u> | Check ONE (OR 2 & AVERAGE)                      |                  | Check ONE (OR 2 & AVERAGE)                             |
| <input type="checkbox"/> BOULDER [9] _____                   | <input checked="" type="checkbox"/> SAND [6] _____ <u>30</u>   | <input type="checkbox"/> LIMESTONE [1]          | SILT:            | <input type="checkbox"/> SILT HEAVY [-2]               |
| <input type="checkbox"/> COBBLE [8] _____ <u>10</u>          | <input type="checkbox"/> BEDROCK [5] _____                     | <input checked="" type="checkbox"/> TILLS [1]   |                  | <input checked="" type="checkbox"/> SILT MODERATE [-1] |
| <input type="checkbox"/> HARDPAN [4] _____ <u>15</u>         | <input type="checkbox"/> DETRITUS [3] _____                    | <input type="checkbox"/> WETLANDS [0]           |                  | <input type="checkbox"/> SILT NORMAL [0]               |
| <input type="checkbox"/> MUCK [2] _____                      | <input type="checkbox"/> ARTIFICIAL [0] _____                  | <input checked="" type="checkbox"/> HARDPAN [0] |                  | <input type="checkbox"/> SILT FREE [1]                 |
| <input type="checkbox"/> SILT [2] _____ <u>20</u>            | NOTE: Ignore Sludge Originating From Point Sources             | <input type="checkbox"/> SANDSTONE [0]          | EMBEDDED         | <input type="checkbox"/> EXTENSIVE [-2]                |
| -----                                                        |                                                                | <input type="checkbox"/> RIP/RAP [0]            | NESS:            | <input checked="" type="checkbox"/> MODERATE [-1]      |
| NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >) |                                                                | <input type="checkbox"/> LACUSTRINE [0]         |                  | <input type="checkbox"/> NORMAL [0]                    |
| <input type="checkbox"/> 4 or More [2]                       |                                                                | <input type="checkbox"/> SHALE [-1]             |                  | <input type="checkbox"/> NONE [1]                      |
| <input checked="" type="checkbox"/> 3 or Less [0]            |                                                                | <input type="checkbox"/> COAL FINES [-2]        |                  |                                                        |

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

|                                       |                            |                                                 |                    |
|---------------------------------------|----------------------------|-------------------------------------------------|--------------------|
| (Structure)                           | TYPE: Score All That Occur | AMOUNT: (Check ONLY One or check 2 and AVERAGE) | Cover              |
| <u>0</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <input type="checkbox"/> EXTENSIVE > 75% [11]   | <b>7</b><br>Max 20 |
| <u>3</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <input type="checkbox"/> MODERATE 25-75% [7]    |                    |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>0</u> BOULDERS [1]      | <input type="checkbox"/> SPARSE 5-25% [3]       |                    |
| <u>0</u> ROOTMATS [1]                 | COMMENTS: _____            | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |                    |
|                                       |                            |                                                 |                    |

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

|                                              |                                              |                                                    |                                             |                                                         |                    |
|----------------------------------------------|----------------------------------------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------------------|--------------------|
| SINUOSITY                                    | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY                                   | MODIFICATIONS/OTHER                                     | Channel            |
| <input type="checkbox"/> HIGH [4]            | <input type="checkbox"/> EXCELLENT [7]       | <input type="checkbox"/> NONE [6]                  | <input type="checkbox"/> HIGH [3]           | <input type="checkbox"/> SNAGGING                       | <b>6</b><br>Max 20 |
| <input type="checkbox"/> MODERATE [3]        | <input type="checkbox"/> GOOD [5]            | <input type="checkbox"/> RECOVERED [4]             | <input type="checkbox"/> MODERATE [2]       | <input checked="" type="checkbox"/> RELOCATION          |                    |
| <input type="checkbox"/> LOW [2]             | <input type="checkbox"/> FAIR [3]            | <input checked="" type="checkbox"/> RECOVERING [3] | <input checked="" type="checkbox"/> LOW [1] | <input checked="" type="checkbox"/> CANOPY REMOVAL      |                    |
| <input checked="" type="checkbox"/> NONE [1] | <input checked="" type="checkbox"/> POOR [1] | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                             | <input type="checkbox"/> DREDGING                       |                    |
|                                              |                                              |                                                    |                                             | <input type="checkbox"/> BANK SHAPING                   |                    |
|                                              |                                              |                                                    |                                             | <input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS |                    |

COMMENTS: \_\_\_\_\_

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

|                                                           |                                                           |                                                  |                        |
|-----------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------|------------------------|
| RIPARIAN WIDTH                                            | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)             | BANK EROSION                                     | Riparian               |
| L R (Per Bank)                                            | L R (Most Predominant Per Bank)                           | L R (Per Bank)                                   | <b>3 1/2</b><br>Max 10 |
| <input type="checkbox"/> WIDE > 50m [4]                   | <input type="checkbox"/> FOREST, SWAMP [3]                | <input type="checkbox"/> NONE/LITTLE [3]         |                        |
| <input type="checkbox"/> MODERATE 10-50m [3]              | <input type="checkbox"/> SHRUB OR OLD FIELD [2]           | <input checked="" type="checkbox"/> MODERATE [2] |                        |
| <input checked="" type="checkbox"/> NARROW 5-10 m [2]     | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> HEAVY/SEVERE [1]        |                        |
| <input checked="" type="checkbox"/> VERY NARROW < 5 m [1] | <input type="checkbox"/> FENCED PASTURE [1]               |                                                  |                        |
| <input type="checkbox"/> NONE [0]                         |                                                           |                                                  |                        |

COMMENTS: \_\_\_\_\_

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

|                                                     |                                                        |                                            |                    |
|-----------------------------------------------------|--------------------------------------------------------|--------------------------------------------|--------------------|
| MAX. DEPTH (Check 1 ONLY!)                          | MORPHOLOGY (Check 1 or 2 & AVERAGE)                    | CURRENT VELOCITY (Check All That Apply)    | Pool/Current       |
| <input type="checkbox"/> > 1m [6]                   | <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> EDDIES [1]        | <b>0</b><br>Max 12 |
| <input type="checkbox"/> 0.7-1m [4]                 | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> FAST [1]          |                    |
| <input type="checkbox"/> 0.4-0.7m [2]               | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]    | <input type="checkbox"/> MODERATE [1]      |                    |
| <input type="checkbox"/> 0.2-0.4m [1]               |                                                        | <input type="checkbox"/> INTERMITTENT [-2] |                    |
| <input checked="" type="checkbox"/> < 0.2m [POOL=0] | COMMENTS: _____                                        | <input type="checkbox"/> SLOW [1]          |                    |
|                                                     |                                                        | <input type="checkbox"/> TORRENTIAL [-1]   |                    |

CHECK ONE OR CHECK 2 AND AVERAGE

|                                                                  |                                       |                                                               |                                         |                   |
|------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------|-----------------------------------------|-------------------|
| RIFFLE DEPTH                                                     | RUN DEPTH                             | RIFFLE/RUN SUBSTRATE                                          | RIFFLE/RUN EMBEDDEDNESS                 | Riffle/Run        |
| <input type="checkbox"/> Best Areas > 10 cm [2]                  | <input type="checkbox"/> MAX > 50 [2] | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> NONE [2]       | <b>0</b><br>Max 8 |
| <input type="checkbox"/> Best Areas 5-10 cm [1]                  | <input type="checkbox"/> MAX < 50 [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> LOW [1]        |                   |
| <input checked="" type="checkbox"/> Best Areas < 5 cm [RIFFLE=0] |                                       | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> MODERATE [0]   |                   |
|                                                                  |                                       |                                                               | <input type="checkbox"/> EXTENSIVE [-1] |                   |

COMMENTS: \_\_\_\_\_  NO RIFFLE [Metric=0]

6) GRADIENT (ft/mi): 6.1 DRAINAGE AREA (sq. mi.): 2.2

|                     |                    |
|---------------------|--------------------|
| % POOL: <u>20</u>   | % GLIDE: <u>60</u> |
| % RIFFLE: <u>10</u> | % RUN: <u>10</u>   |

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:

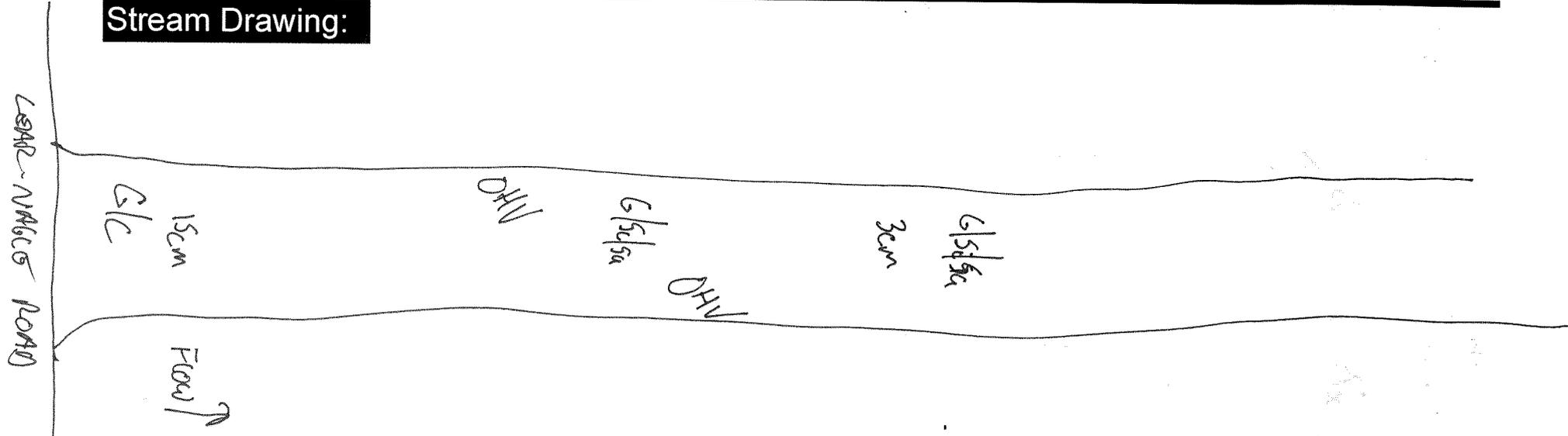
- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

| Stream Measurements: |               |               |                    |                |                |                    |                 |                 |                 |
|----------------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|-----------------|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Width | Entrench. Ratio |
|                      |               |               |                    |                |                |                    |                 |                 |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

**QUARRY DITCH NOTES**

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Quarry Ditch 0.0  
Stream Segment Location: At Mouth of Ditch (French Creek RM 0.38)  
QHEI Score: 50 HHEI Score: 62

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**FIELD NOTES:**

This tributary enters French Creek from the south approximately 1500' east of the convergence of French Creek with the Black River. The tributary is impounded by an un-culverted roadway used for off-road vehicles, approximately 400 feet from French Creek. Other degradation includes the placement of soil, fill and construction and demolition material (rebar, etc.) along the banks. The fringe of the 2-4' wide channel contains purple loosestrife and reed canary grass. The forested buffer is fairly narrow with old field beyond the woody vegetation. The water depth is generally 6" in the deeper pools. The tributary appears to be intermittent. There is some potential for restoration (removal of dam, C&D material).

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**PHOTOS:**



1) Quarry Ditch – Looking downstream from road impoundment.



Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 50

River Code: RM: 0.0 Stream: QUARRY DITCH (UN-NAMED TRIBUTARY TO FRENCH CREEK AT RM 0.38)
Date: 8/20/02 Location: AT MOUTH - FRENCH CREEK R.M.O. 38
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present

TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
BLDR/SLBS, BOULDER, COBBLE, HARDPAN, MUCK, SILT, GRAVEL, SAND, BEDROCK, DETRITUS, ARTIFICIAL, LIMESTONE, TILLS, WETLANDS, HARDPAN, SANDSTONE, RIP/RAP, LACUSTRINE, SHALE, COAL FINES
Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)

Substrate 8 Max 20

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

TYPE: Score All That Occur AMOUNT: (Check ONLY One or check 2 and AVERAGE)
UNDERCUT BANKS, OVERHANGING VEGETATION, SHALLOWS, ROOTMATS, POOLS, ROOTWADS, BOULDERS, OXBOWS, AQUATIC MACROPHYTES, LOGS OR WOODY DEBRIS
EXTENSIVE, MODERATE, SPARSE, NEARLY ABSENT

Cover 12 Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
HIGH, MODERATE, LOW, NONE, EXCELLENT, GOOD, FAIR, POOR, NONE, RECENT OR NO RECOVERY, HIGH, MODERATE, LOW, SNAGGING, RELOCATION, CANOPY REMOVAL, DREDGING, IMPOUND, ISLANDS, LEVEED, BANK SHAPING, ONE SIDE CHANNEL MODIFICATIONS

Channel 9 Max 20

COMMENTS:

4]. RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION
WIDE, MODERATE, NARROW, VERY NARROW, NONE, FOREST, SHRUB, RESIDENTIAL, FENCED PASTURE, CONSERVATION TILLAGE, URBAN, OPEN PASTURE, MINING, NONE/LITTLE, MODERATE, HEAVY/SEVERE

Riparian 5 Max 10

COMMENTS:

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH MORPHOLOGY CURRENT VELOCITY (POOLS & RIFFLES!)
>1m, 0.7-1m, 0.4-0.7m, 0.2-0.4m, <0.2m, POOL WIDTH > RIFFLE WIDTH, POOL WIDTH = RIFFLE WIDTH, POOL WIDTH < RIFFLE W., EDDIES, FAST, MODERATE, SLOW, TORRENTIAL, INTERSTITIAL, INTERMITTENT, VERY FAST

Pool/Current 3 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS
Best Areas >10 cm, Best Areas 5-10 cm, Best Areas < 5 cm, MAX > 50, MAX < 50, STABLE, MOD. STABLE, UNSTABLE, NONE, LOW, MODERATE, EXTENSIVE

Riffle/Run 3 Max 8

COMMENTS: NO RIFFLE [Metric=0]

6] GRADIENT (ft/mi): 20 DRAINAGE AREA (sq.mi.): 0.2 %POOL: 20 %GLIDE: - %RIFFLE: 50 %RUN: 30

Gradient 10 Max 10

\* Best areas must be large enough to support a population of riffle-obligate species





# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3):

62

SITE NAME/LOCATION UNNAMED DITCH AT FRENCH CREEK R.M.O. 39 ("QUARRY" DITCH)

SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 0.2

LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 0.0

DATE 8/20/02 SCORER JAY MILLER COMMENTS \_\_\_\_\_

**NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions**

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY  
MODIFICATIONS:

**1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.**

| TYPE                                                         | PERCENT   | TYPE                                                   | PERCENT   |
|--------------------------------------------------------------|-----------|--------------------------------------------------------|-----------|
| <input type="checkbox"/> BLDR SLABS [16 pts]                 | _____     | <input checked="" type="checkbox"/> SILT [3 pt]        | <u>20</u> |
| <input type="checkbox"/> BOULDER (>256 mm) [16 pts]          | _____     | <input type="checkbox"/> LEAF PACKWOODY DEBRIS [3 pts] | _____     |
| <input type="checkbox"/> BEDROCK [16 pt]                     | _____     | <input type="checkbox"/> FINE DETRITUS [3 pts]         | _____     |
| <input type="checkbox"/> COBBLE (65-256 mm) [12 pts]         | <u>5</u>  | <input type="checkbox"/> CLAY or HARDPAN [0 pt]        | <u>5</u>  |
| <input checked="" type="checkbox"/> GRAVEL (2-64 mm) [9 pts] | <u>65</u> | <input type="checkbox"/> MUCK [0 pts]                  | <u>5</u>  |
| <input type="checkbox"/> SAND (<2 mm) [6 pts]                | _____     | <input type="checkbox"/> ARTIFICIAL [3 pts]            | _____     |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 5

(A) 12

(B) 5

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES:

**HHEI Metric Points**

Substrate Max = 40

17

A + B

Pool Depth Max = 30

30

Bankfull Width Max=30

15

**2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):**

|                                                             |                                                            |
|-------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts]          | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input checked="" type="checkbox"/> > 22.5 - 30 cm [30 pts] | <input type="checkbox"/> < 5 cm [5 pts]                    |
| <input type="checkbox"/> > 10 - 22.5 cm [25 pts]            | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS \_\_\_\_\_

MAXIMUM POOL DEPTH (centimeters):

26

**3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):**

|                                                                     |                                                                                |
|---------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]              | <input checked="" type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]   | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                             |
| <input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts] |                                                                                |

COMMENTS \_\_\_\_\_

AVERAGE BANKFULL WIDTH (meters)

1.06

This information must also be completed

**RIPARIAN ZONE AND FLOODPLAIN QUALITY** ☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                      |                                     | FLOODPLAIN QUALITY                  |                                     |                          |                          |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| L                                   | R                                   | L                                   | R                                   | L                        | R                        |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (Per Bank)                          | Wide >10m                           | (Most Predominant per Bank)         | Mature Forest, Wetland              |                          | Conservation Tillage     |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
|                                     | Moderate 5-10m                      |                                     | Immature Forest, Shrub or Old Field |                          | Urban or Industrial      |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|                                     | Narrow <5m                          |                                     | Residential, Park, New Field        |                          | Open Pasture, Row Crop   |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
|                                     | None                                |                                     | Fenced Pasture                      |                          | Mining or Construction   |

COMMENTS \_\_\_\_\_

**FLOW REGIME (At Time of Evaluation) (Check ONLY one box):**  
 Stream Flowing  Moist Channel, isolated pools, no flow (Intermittent)  
 Subsurface flow with isolated pools (Interstitial)  Dry channel, no water (Ephemeral)  
 COMMENTS \_\_\_\_\_

**SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):**  
 None  1.0  2.0  3.0  
 0.5  1.5  2.5  >3

**STREAM GRADIENT ESTIMATE**

Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score 50 (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

WWH Name: FRENCH CREEK Distance from Evaluated Stream AT MOUTH  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH NRCS Soil Map Page: 7 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LORAIN Township / City: SHEFFIELD

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: 8/19/02 Quantity: \_\_\_\_\_

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): N Canopy (% open): 80%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_

Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: ACCESS ROAD DAMS CROSS FROM A POND/WETLAND  
ADDA CREATED BY PAST QUARRY MINING ACTIVITIES - NO CULVERT NOTED

**BIOTIC EVALUATION**

Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_

Comments Regarding Biology: \_\_\_\_\_

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location

FLOW → SEE QHEI FORM

**SUBJECT: U.S. Army Corps of Engineers, Buffalo District - Survey of French Creek  
Final Report - July 2004**

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**JUNGLUTH DITCH NOTES**

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Jungbluth Ditch 0.0  
Stream Segment Location: Mouth of Ditch (French Creek RM 0.54)  
QHEI Score: 58.5 HHEI Score: NA

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FIELD NOTES: 20 AUG 2002

Jungbluth Ditch (a.k.a. Sugar Creek) enters French Creek immediately east of East River Road. The upland forested buffer on the west bank is narrow (20') before encountering a gravel trail that parallels East River Road. The road is immediately adjacent to the trail. The east bank has a wide (>100m) forested buffer with dominant tree species including black walnut, white ash, sugar maple, sycamore, American hornbeam and eastern cottonwood. Macroinvertebrates were noted in the creek channel that was dominated by shale gravel with silt, sand and cobbles and concrete slabs.

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PHOTOS:

No photo's available.



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **58.5**

River Code: RM: 0.0 Stream: JUNG BLUTH DITCH  
 Date: 8-20-02 Location: MOUTH - AT FRENCH CREEK RM 0.54  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                                      | POOL RIFFLE                                                         | POOL RIFFLE                                    | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                    |
|-----------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------|------------------|------------------------------------------------------|
| <input type="checkbox"/> -BLDR /SLBS [10]                 | <input checked="" type="checkbox"/> -GRAVEL [7] <u>60</u> <u>65</u> | Check ONE (OR 2 & AVERAGE)                     |                  | Check ONE (OR 2 & AVERAGE)                           |
| <input type="checkbox"/> -BOULDER [9] <u>10</u> <u>10</u> | <input checked="" type="checkbox"/> -SAND [6] <u>15</u> <u>15</u>   | <input type="checkbox"/> -LIMESTONE [1]        | SILT:            | <input type="checkbox"/> -SILT HEAVY [-2]            |
| <input type="checkbox"/> -COBBLE [8]                      | <input type="checkbox"/> -BEDROCK [5]                               | <input checked="" type="checkbox"/> -TILLS [1] |                  | <input type="checkbox"/> -SILT MODERATE [-1]         |
| <input type="checkbox"/> -HARDPAN [4]                     | <input type="checkbox"/> -DETritus [3]                              | <input type="checkbox"/> -WETLANDS [0]         |                  | <input checked="" type="checkbox"/> -SILT NORMAL [0] |
| <input type="checkbox"/> -MUCK [2]                        | <input type="checkbox"/> -ARTIFICIAL [0]                            | <input type="checkbox"/> -HARDPAN [0]          |                  | <input type="checkbox"/> -SILT FREE [1]              |
| <input type="checkbox"/> -SILT [2] <u>15</u> <u>10</u>    | NOTE: Ignore Sludge Originating From Point Sources                  | <input type="checkbox"/> -SANDSTONE [0]        | EMBEDDED         | <input type="checkbox"/> -EXTENSIVE [-2]             |
|                                                           |                                                                     | <input type="checkbox"/> -RIP/RAP [0]          | NESS:            | <input type="checkbox"/> -MODERATE [-1]              |
|                                                           |                                                                     | <input type="checkbox"/> -LACUSTRINE [0]       |                  | <input checked="" type="checkbox"/> -NORMAL [0]      |
|                                                           |                                                                     | <input type="checkbox"/> -SHALE [-1]           |                  | <input type="checkbox"/> -NONE [1]                   |
|                                                           |                                                                     | <input type="checkbox"/> -COAL FINES [-2]      |                  |                                                      |

Substrate  
**14**  
Max 20

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
 (High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS:

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)  
 (Structure) TYPE: Score All That Occur

|                                       |                            |                                   |
|---------------------------------------|----------------------------|-----------------------------------|
| <u>1</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <u>0</u> OXBOWS, BACKWATERS [1]   |
| <u>3</u> OVERHANGING VEGETATION [1]   | <u>1</u> ROOTWADS [1]      | <u>0</u> AQUATIC MACROPHYTES [1]  |
| <u>1</u> SHALLOWS (IN SLOW WATER) [1] | <u>2</u> BOULDERS [1]      | <u>2</u> LOGS OR WOODY DEBRIS [1] |
| <u>2</u> ROOTMATS [1]                 | COMMENTS:                  |                                   |

AMOUNT: (Check ONLY One or check 2 and AVERAGE)

|                                                   |
|---------------------------------------------------|
| <input type="checkbox"/> - EXTENSIVE > 75% [11]   |
| <input type="checkbox"/> - MODERATE 25-75% [7]    |
| <input type="checkbox"/> - SPARSE 5-25% [3]       |
| <input type="checkbox"/> - NEARLY ABSENT < 5% [1] |

Cover  
**12**  
Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                     | DEVELOPMENT                                    | CHANNELIZATION                                       | STABILITY                                          | MODIFICATIONS/OTHER                                                  |
|-----------------------------------------------|------------------------------------------------|------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------|
| <input type="checkbox"/> - HIGH [4]           | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                  | <input type="checkbox"/> - HIGH [3]                | <input type="checkbox"/> - SNAGGING                                  |
| <input type="checkbox"/> - MODERATE [3]       | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]             | <input checked="" type="checkbox"/> - MODERATE [2] | <input checked="" type="checkbox"/> - RELOCATION                     |
| <input checked="" type="checkbox"/> - LOW [2] | <input checked="" type="checkbox"/> - FAIR [3] | <input checked="" type="checkbox"/> - RECOVERING [3] | <input type="checkbox"/> - LOW [1]                 | <input type="checkbox"/> - CANOPY REMOVAL                            |
| <input type="checkbox"/> - NONE [1]           | <input type="checkbox"/> - POOR [1]            | <input type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                                    | <input type="checkbox"/> - LEVEED                                    |
|                                               |                                                |                                                      |                                                    | <input type="checkbox"/> - DREDGING                                  |
|                                               |                                                |                                                      |                                                    | <input checked="" type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS |
|                                               |                                                |                                                      |                                                    | <input type="checkbox"/> - IMPOUND.                                  |
|                                               |                                                |                                                      |                                                    | <input type="checkbox"/> - ISLANDS                                   |
|                                               |                                                |                                                      |                                                    | <input type="checkbox"/> - BANK SHAPING                              |

Channel  
**10**  
Max 20

COMMENTS:

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

| RIPARIAN WIDTH                      |                                                          | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) |                                                           | BANK EROSION                        |                                                              |
|-------------------------------------|----------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|-------------------------------------|--------------------------------------------------------------|
| L                                   | R (Per Bank)                                             | L                                             | R (Most Predominant Per Bank)                             | L                                   | R (Per Bank)                                                 |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> WIDE > 50m [4]       | <input checked="" type="checkbox"/>           | <input checked="" type="checkbox"/> FOREST, SWAMP [3]     | <input type="checkbox"/>            | <input checked="" type="checkbox"/> CONSERVATION TILLAGE [1] |
| <input type="checkbox"/>            | <input type="checkbox"/> MODERATE 10-50m [3]             | <input type="checkbox"/>                      | <input type="checkbox"/> SHRUB OR OLD FIELD [2]           | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> URBAN OR INDUSTRIAL [0]  |
| <input type="checkbox"/>            | <input type="checkbox"/> NARROW 5-10 m [2]               | <input type="checkbox"/>                      | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/>            | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0]           |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> VERY NARROW <5 m [1] | <input type="checkbox"/>                      | <input type="checkbox"/> FENCED PASTURE [1]               | <input type="checkbox"/>            | <input type="checkbox"/> MINING/CONSTRUCTION [0]             |
| <input type="checkbox"/>            | <input type="checkbox"/> NONE [0]                        |                                               |                                                           |                                     |                                                              |
|                                     |                                                          |                                               |                                                           |                                     | <input checked="" type="checkbox"/> NONE/LITTLE [3]          |
|                                     |                                                          |                                               |                                                           |                                     | <input checked="" type="checkbox"/> MODERATE [2]             |
|                                     |                                                          |                                               |                                                           |                                     | <input type="checkbox"/> HEAVY/SEVERE [1]                    |

Riparian  
**6 1/2**  
Max 10

COMMENTS:

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH                                          | MORPHOLOGY                                                          | CURRENT VELOCITY [ POOLS & RIFFLES! ]          |
|-----------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------|
| (Check 1 ONLY!)                                     | (Check 1 or 2 & AVERAGE)                                            | (Check All That Apply)                         |
| <input type="checkbox"/> - >1m [6]                  | <input type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2]            | <input type="checkbox"/> - EDDIES [1]          |
| <input type="checkbox"/> - 0.7-1m [4]               | <input checked="" type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> - FAST [1]            |
| <input type="checkbox"/> - 0.4-0.7m [2]             | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> - MODERATE [1]        |
| <input checked="" type="checkbox"/> - 0.2- 0.4m [1] |                                                                     | <input checked="" type="checkbox"/> - SLOW [1] |
| <input type="checkbox"/> - < 0.2m [POOL=0]          | COMMENTS:                                                           | <input type="checkbox"/> - TORRENTIAL [-1]     |
|                                                     |                                                                     | <input type="checkbox"/> - INTERSTITIAL [-1]   |
|                                                     |                                                                     | <input type="checkbox"/> - INTERMITTENT [-2]   |
|                                                     |                                                                     | <input type="checkbox"/> - VERY FAST [1]       |

Pool/  
Current  
**3**  
Max 12

| CHECK ONE OR CHECK 2 AND AVERAGE                            |                                                    |                                                                            |                                               |
|-------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------|
| RIFFLE DEPTH                                                | RUN DEPTH                                          | RIFFLE/RUN SUBSTRATE                                                       | RIFFLE/RUN EMBEDDEDNESS                       |
| <input checked="" type="checkbox"/> - Best Areas >10 cm [2] | <input type="checkbox"/> - MAX > 50 [2]            | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]              | <input type="checkbox"/> - NONE [2]           |
| <input type="checkbox"/> - Best Areas 5-10 cm [1]           | <input checked="" type="checkbox"/> - MAX < 50 [1] | <input checked="" type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1] | <input checked="" type="checkbox"/> - LOW [1] |
| <input type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0]     |                                                    | <input type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0]                | <input type="checkbox"/> - MODERATE [0]       |
|                                                             |                                                    |                                                                            | <input type="checkbox"/> - EXTENSIVE [-1]     |
| COMMENTS:                                                   |                                                    | <input type="checkbox"/> - NO RIFFLE [Metric=0]                            |                                               |

Riffle/Run  
**5**  
Max 8  
Gradient  
**8**  
Max 10

6] GRADIENT (ft/mi): 30.8 DRAINAGE AREA (sq.mi.): 6.5  
 %POOL: 20 %GLIDE: -  
 %RIFFLE: 50 %RUN: 30

\*\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_

\_\_\_\_\_

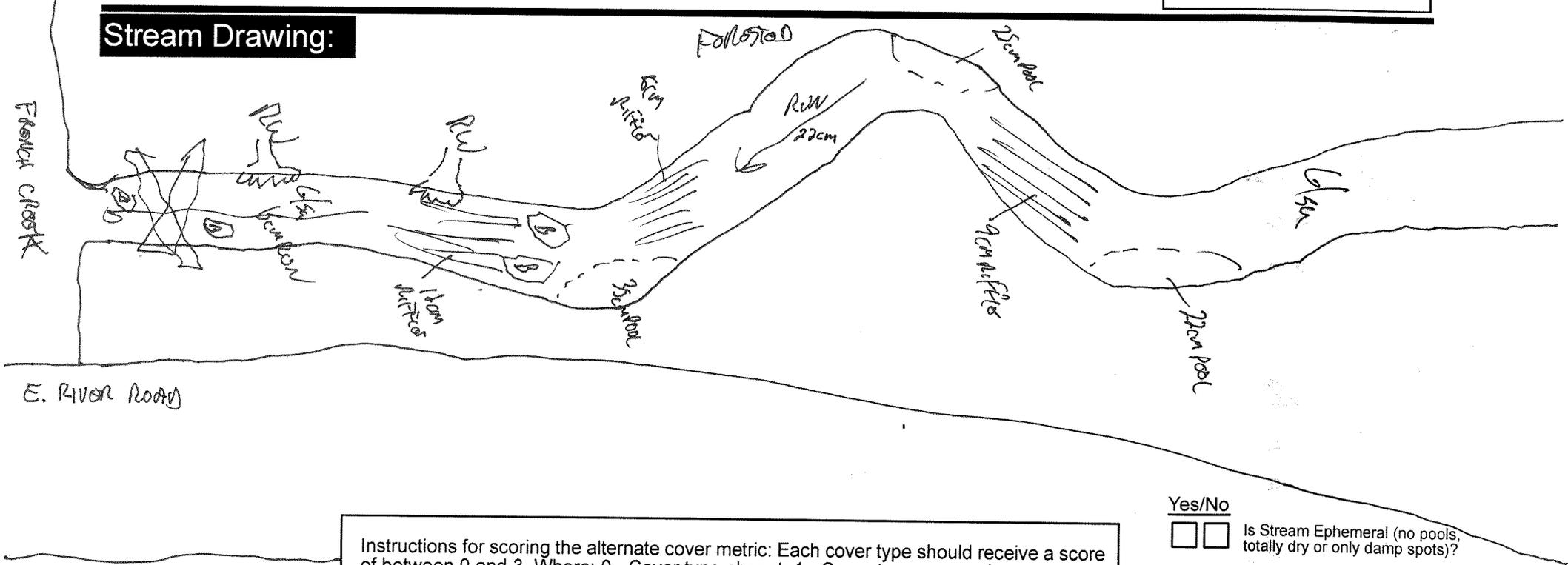
\_\_\_\_\_

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                                                                                                                  |                                                                                                                 |                           |                      |                     |                      |                    |                       |                 |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------|----------------------|---------------------|----------------------|--------------------|-----------------------|-----------------|
|                                                                                                                  | Gear: _____                                                                                                     | Distance: _____           | Water Clarity: _____ | Water Stage: _____  | Canopy -% Open _____ |                    |                       |                 |
| <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Subjective Rating (1-10) | <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Aesthetic Rating (1-10) | First Sampling Pass _____ |                      |                     |                      |                    |                       |                 |
| Stream Measurements:                                                                                             |                                                                                                                 |                           |                      |                     |                      |                    |                       |                 |
| Average Width                                                                                                    | Average Depth                                                                                                   | Maximum Depth             | Av. Bankfull Width   | Bankfull Mean Depth | W/D Ratio            | Bankfull Max Depth | Floodprone Area Width | Entrench. Ratio |
|                                                                                                                  |                                                                                                                 |                           |                      |                     |                      |                    |                       |                 |

- Low,  - Moderate,  - High

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Jungbluth Ditch 1.0  
Stream Segment Location: Upstream of Park Road Bridge  
QHEI Score: 65 HHEI Score: NA

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FIELD NOTES: 20 AUG 2002

This portion of Jungbluth Ditch is located on the east side of the French Creek Reservation Park Road Bridge. Minnows and macroinvertebrates were noted in this stretch. Loose, sandy substrate was noted immediately east of the bridge. The overall substrate is dominated by sand and detritus, with gravel, cobbles, boulders, and silt. The wide forested riparian buffers on both sides of the creek are dominated by sugar maple and shagbark hickory. A roadside ditch follows southward along Park Road and enters the creek near the bridge. The sinuous creek has 4-8' banks on either side.

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PHOTOS:



1) Jungbluth Ditch 1.0 – Facing upstream from bridge



2) Jungbluth Ditch 1.0 – Facing downstream towards bridge



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **65**

River Code: RM: 1.0 Stream: JUNGWUTH DITCH  
Date: 8-20-02 Location: AT PARK ROAD BRIDGE (FRONCH CREEK RESERVATION)  
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)  
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY  
 -BLDR /SLBS[10]  -GRAVEL [7] 20 30 Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)  
 -BOULDER [9] 5 5  -SAND [6] 25 30  -LIMESTONE [1] SILT:  -SILT HEAVY [-2]  
 -COBBLE [8] 5 10  -BEDROCK[5]  -TILLS [1]  -SILT MODERATE [-1]  
 -HARDPAN [4]  -DETRITUS[3] 25 20  -WETLANDS[0]  -SILT NORMAL [0]  
 -MUCK [2]  -ARTIFICIAL[0]  -HARDPAN [0]  -SILT FREE [1]  
 -SILT [2] 20 15 NOTE: Ignore Sludge Originating From Point Sources  -SANDSTONE [0] EMBEDDED  -EXTENSIVE [-2]  
 -RIP/RAP [0] NESS:  -MODERATE [-1]  
 -LACUSTRINE [0]  -NORMAL [0]  
 -SHALE [-1]  -NONE [1]  
 -COAL FINES [-2]

Substrate  
**11 1/2**  
Max 20

NUMBER OF SUBSTRATE TYPES: 4 or More [2]  
(High Quality Only, Score 5 or >)  3 or Less [0]  
COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) AMOUNT: (Check ONLY One or check 2 and AVERAGE)  
(Structure) TYPE: Score All That Occur  
1 UNDERCUT BANKS [1] 2 POOLS > 70 cm [2] 0 OXBOWS, BACKWATERS [1]  - EXTENSIVE > 75% [11]  
2 OVERHANGING VEGETATION [1] 1 ROOTWADS [1] 0 AQUATIC MACROPHYTES [1]  - MODERATE 25-75% [7]  
0 SHALLOWS (IN SLOW WATER) [1] 1 BOULDERS [1] 1 LOGS OR WOODY DEBRIS [1]  - SPARSE 5-25% [3]  
1 ROOTMATS [1] COMMENTS:  - NEARLY ABSENT < 5%[1]

Cover  
**9**  
Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )  
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER  
 - HIGH [4]  - EXCELLENT [7]  - NONE [6]  - HIGH [3]  - SNAGGING  - IMPOUND.  
 - MODERATE [3]  - GOOD [5]  - RECOVERED [4]  - MODERATE [2]  - RELOCATION  - ISLANDS  
 - LOW [2]  - FAIR [3]  - RECOVERING [3]  - LOW [1]  - CANOPY REMOVAL  - LEVEED  
 - NONE [1]  - POOR [1]  - RECENT OR NO RECOVERY [1]  - DREDGING  - BANK SHAPING  
 - ONE SIDE CHANNEL MODIFICATIONS

Channel  
**15**  
Max 20

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream   
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION  
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)  
 - WIDE > 50m [4]  - FOREST, SWAMP [3]  - CONSERVATION TILLAGE [1]  - NONE/LITTLE [3]  
 - MODERATE 10-50m [3]  - SHRUB OR OLD FIELD [2]  - URBAN OR INDUSTRIAL [0]  - MODERATE [2]  
 - NARROW 5-10 m [2]  - RESIDENTIAL, PARK, NEW FIELD [1]  - OPEN PASTURE, ROWCROP [0]  - HEAVY/SEVERE [1]  
 - VERY NARROW < 5 m [1]  - FENCED PASTURE [1]  - MINING/CONSTRUCTION [0]  
 - NONE [0]

Riparian  
**8 1/2**  
Max 10

5) POOL/GLIDE AND RIFFLE/RUN QUALITY  
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY ( POOLS & RIFFLES!)  
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)  
 - >1m [6]  - POOL WIDTH > RIFFLE WIDTH [2]  - EDDIES[1]  - TORRENTIAL[-1]  
 - 0.7-1m [4]  - POOL WIDTH = RIFFLE WIDTH [1]  - FAST[1]  - INTERSTITIAL[-1]  
 - 0.4-0.7m [2]  - POOL WIDTH < RIFFLE W. [0]  - MODERATE [1]  - INTERMITTENT[-2]  
 - 0.2- 0.4m [1]  - SLOW [1]  - VERY FAST[1]  
 - < 0.2m [POOL=0] COMMENTS:

Pool/  
Current  
**6**  
Max 12

CHECK ONE OR CHECK 2 AND AVERAGE  
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS  
 - Best Areas >10 cm [2]  - MAX > 50 [2]  - STABLE (e.g.,Cobble, Boulder) [2]  - NONE [2]  
 - Best Areas 5-10 cm [1]  - MAX < 50[1]  - MOD. STABLE (e.g., Large Gravel) [1]  - LOW [1]  
 - Best Areas < 5 cm [RIFFLE=0]  - UNSTABLE (Fine Gravel, Sand) [0]  - MODERATE [0]  
 - NO RIFFLE [Metric=0]  - EXTENSIVE [-1]

Riffle/Run  
**5**  
Max 8  
Gradient  
**10**  
Max 10

6) GRADIENT (ft/mi): 22.2 DRAINAGE AREA (sq.mi.): 6.2  
%POOL: 30 %GLIDE: -  
%RIFFLE: 30 %RUN: 40

Is Sampling Reach Representative of the Stream (Y/N)\_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:

- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

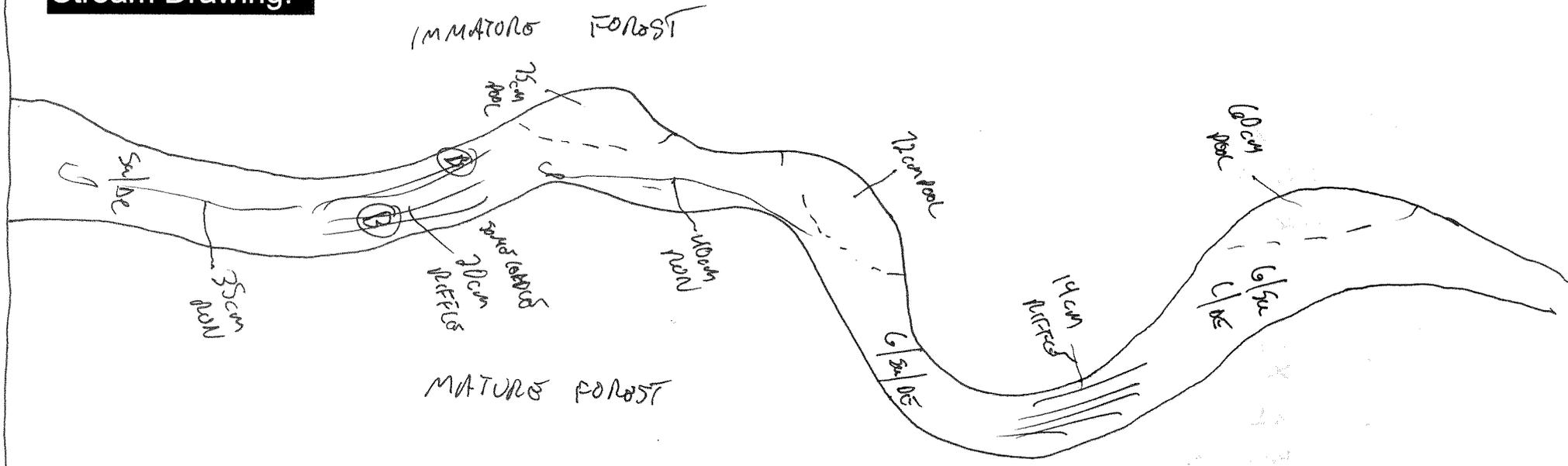
First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Mean Depth | W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|---------------------|-----------|--------------------|-----------------|-----------------|
|               |               |               |                    |                     |           |                    |                 |                 |

**Stream Drawing:**

PARK ROAD BRIDGE



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Jungbluth Ditch 1.6  
Stream Segment Location: At French Creek Road  
QHEI Score: 35.5 HHEI Score: NA

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**FIELD NOTES:**

This section of Jungbluth Ditch is located on the south side of French Creek Road. The ditch has been dredged and maintained with a 6' +/- mowed strip on the east side. The channel is straight and consistent in depth. The west side of the ditch has a wide shrub buffer dominated by silky dogwood, gray-stemmed dogwood, and northern arrowwood. The eastern fringe of the channel is dominated by purple loosestrife. The water depth generally ranges from 40-50 cm. This area has some potential for restoration.

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**PHOTOS:**



1) Jungbluth Ditch 1.6 – Facing upstream from bridge



2) Jungbluth Ditch 1.6 – Facing downstream



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **35.5**

River Code: RM: 1.6 Stream: JUNGBLUTH DITCH  
 Date: 8-21-02 Location: AT FRENCH CROOK ROAD  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

| TYPE                                                              | POOL RIFFLE                                              | POOL RIFFLE                                      | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                    |
|-------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------|------------------|------------------------------------------------------|
| <input type="checkbox"/> -BLDR /SLBS[10]                          | <input type="checkbox"/> -GRAVEL [7] <u>20</u> <u>30</u> | Check ONE (OR 2 & AVERAGE)                       |                  | Check ONE (OR 2 & AVERAGE)                           |
| <input type="checkbox"/> -BOULDER [9]                             | <input type="checkbox"/> -SAND [6] <u>10</u> <u>20</u>   | <input type="checkbox"/> -LIMESTONE [1]          | SILT:            | <input checked="" type="checkbox"/> -SILT HEAVY [-2] |
| <input type="checkbox"/> -COBBLE [8] <u>10</u> <u>30</u>          | <input type="checkbox"/> -BEDROCK[5]                     | <input checked="" type="checkbox"/> -TILLS [1]   |                  | <input type="checkbox"/> -SILT MODERATE [-1]         |
| <input type="checkbox"/> -HARDPAN [4]                             | <input type="checkbox"/> -DETRITUS[3]                    | <input type="checkbox"/> -WETLANDS[0]            |                  | <input type="checkbox"/> -SILT NORMAL [0]            |
| <input type="checkbox"/> -MUCK [2]                                | <input type="checkbox"/> -ARTIFICIAL[0]                  | <input type="checkbox"/> -HARDPAN [0]            |                  | <input type="checkbox"/> -SILT FREE [1]              |
| <input checked="" type="checkbox"/> -SILT [2] <u>60</u> <u>20</u> | NOTE: Ignore Sludge Originating From Point Sources       | <input type="checkbox"/> -SANDSTONE [0] EMBEDDED |                  | <input checked="" type="checkbox"/> -EXTENSIVE [-2]  |
|                                                                   |                                                          | <input type="checkbox"/> -RIP/RAP [0] NESS:      |                  | <input type="checkbox"/> -MODERATE [-1]              |
|                                                                   |                                                          | <input type="checkbox"/> -LACUSTRINE [0]         |                  | <input type="checkbox"/> -NORMAL [0]                 |
|                                                                   |                                                          | <input type="checkbox"/> -SHALE [-1]             |                  | <input type="checkbox"/> -NONE [1]                   |
|                                                                   |                                                          | <input type="checkbox"/> -COAL FINES [-2]        |                  |                                                      |

Substrate  
  
 Max 20

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
 (High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)  
 (Structure) TYPE: Score All That Occur

AMOUNT: (Check ONLY One or check 2 and AVERAGE)

|                                       |                            |                                   |
|---------------------------------------|----------------------------|-----------------------------------|
| <u>2</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <u>0</u> OXBOWS, BACKWATERS [1]   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <u>1</u> AQUATIC MACROPHYTES [1]  |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>0</u> BOULDERS [1]      | <u>0</u> LOGS OR WOODY DEBRIS [1] |
| <u>0</u> ROOTMATS [1]                 | COMMENTS:                  |                                   |

|                                                  |
|--------------------------------------------------|
| <input type="checkbox"/> - EXTENSIVE > 75% [11]  |
| <input type="checkbox"/> - MODERATE 25-75% [7]   |
| <input type="checkbox"/> - SPARSE 5-25% [3]      |
| <input type="checkbox"/> - NEARLY ABSENT < 5%[1] |

Cover  
  
 Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                     | DEVELOPMENT                                    | CHANNELIZATION                                       | STABILITY                                     | MODIFICATIONS/OTHER                                                                               |
|-----------------------------------------------|------------------------------------------------|------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> - HIGH [4]           | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                  | <input type="checkbox"/> - HIGH [3]           | <input type="checkbox"/> - SNAGGING <input type="checkbox"/> - IMPOUND.                           |
| <input type="checkbox"/> - MODERATE [3]       | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]             | <input type="checkbox"/> - MODERATE [2]       | <input type="checkbox"/> - RELOCATION <input type="checkbox"/> - ISLANDS                          |
| <input checked="" type="checkbox"/> - LOW [2] | <input checked="" type="checkbox"/> - FAIR [3] | <input checked="" type="checkbox"/> - RECOVERING [3] | <input checked="" type="checkbox"/> - LOW [1] | <input type="checkbox"/> - CANOPY REMOVAL <input type="checkbox"/> - LEVEED                       |
| <input type="checkbox"/> - NONE [1]           | <input type="checkbox"/> - POOR [1]            | <input type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                               | <input checked="" type="checkbox"/> - DREDGING <input checked="" type="checkbox"/> - BANK SHAPING |
|                                               |                                                |                                                      |                                               | <input checked="" type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS                              |

Channel  
  
 Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

| RIPARIAN WIDTH                      |                                                      | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) |                                                                        | BANK EROSION                        |                                                      |
|-------------------------------------|------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------|-------------------------------------|------------------------------------------------------|
| L                                   | R (Per Bank)                                         | L                                             | R (Most Predominant Per Bank)                                          | L                                   | R (Per Bank)                                         |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> - WIDE > 50m [4] | <input type="checkbox"/>                      | <input type="checkbox"/> - FOREST, SWAMP [3]                           | <input type="checkbox"/>            | <input type="checkbox"/> - CONSERVATION TILLAGE [1]  |
| <input type="checkbox"/>            | <input type="checkbox"/> - MODERATE 10-50m [3]       | <input type="checkbox"/>                      | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]                      | <input checked="" type="checkbox"/> | <input type="checkbox"/> - URBAN OR INDUSTRIAL [0]   |
| <input type="checkbox"/>            | <input type="checkbox"/> - NARROW 5-10 m [2]         | <input checked="" type="checkbox"/>           | <input checked="" type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/>            | <input type="checkbox"/> - OPEN PASTURE, ROWCROP [0] |
| <input type="checkbox"/>            | <input type="checkbox"/> - VERY NARROW <5 m[1]       | <input type="checkbox"/>                      | <input type="checkbox"/> - FENCED PASTURE [1]                          | <input type="checkbox"/>            | <input type="checkbox"/> - MINING/CONSTRUCTION [0]   |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> - NONE [0]       |                                               |                                                                        |                                     |                                                      |

Riparian  
  
 Max 10

COMMENTS:

5.) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH                                         | MORPHOLOGY                                                       | CURRENT VELOCITY [ POOLS & RIFFLES! ]                                                  |
|----------------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| (Check 1 ONLY!)                                    | (Check 1 or 2 & AVERAGE)                                         | (Check All That Apply)                                                                 |
| <input type="checkbox"/> - >1m [6]                 | <input type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2]         | <input type="checkbox"/> - EDDIES[1] <input type="checkbox"/> - TORRENTIAL[-1]         |
| <input type="checkbox"/> - 0.7-1m [4]              | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1]         | <input type="checkbox"/> - FAST[1] <input type="checkbox"/> - INTERSTITIAL[-1]         |
| <input checked="" type="checkbox"/> - 0.4-0.7m [2] | <input checked="" type="checkbox"/> - POOL WIDTH < RIFFLE W. [0] | <input type="checkbox"/> - MODERATE [1] <input type="checkbox"/> - INTERMITTENT[-2]    |
| <input type="checkbox"/> - 0.2- 0.4m [1]           |                                                                  | <input checked="" type="checkbox"/> - SLOW [1] <input type="checkbox"/> - VERY FAST[1] |
| <input type="checkbox"/> - < 0.2m [POOL=0]         |                                                                  |                                                                                        |

Pool/  
 Current  
  
 Max 12

COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                                       | RUN DEPTH                                         | RIFFLE/RUN SUBSTRATE                                                   | RIFFLE/RUN EMBEDDEDNESS                              |
|--------------------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------|
| <input type="checkbox"/> - Best Areas >10 cm [2]                   | <input type="checkbox"/> - MAX > 50 [2]           | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]          | <input type="checkbox"/> - NONE [2]                  |
| <input type="checkbox"/> - Best Areas 5-10 cm[1]                   | <input checked="" type="checkbox"/> - MAX < 50[1] | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1]        | <input type="checkbox"/> - LOW [1]                   |
| <input checked="" type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0] |                                                   | <input checked="" type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0] | <input type="checkbox"/> - MODERATE [0]              |
|                                                                    |                                                   |                                                                        | <input checked="" type="checkbox"/> - EXTENSIVE [-1] |
|                                                                    |                                                   | <input type="checkbox"/> - NO RIFFLE [Metric=0]                        |                                                      |

COMMENTS:

Riffle/Run  
  
 Max 8  
 Gradient  
  
 Max 10

6) GRADIENT (ft/mi): 9.4 DRAINAGE AREA (sq.mi.): 5.4  
 %POOL:  %GLIDE:   
 %RIFFLE:  %RUN:

\*\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
- Other: \_\_\_\_\_

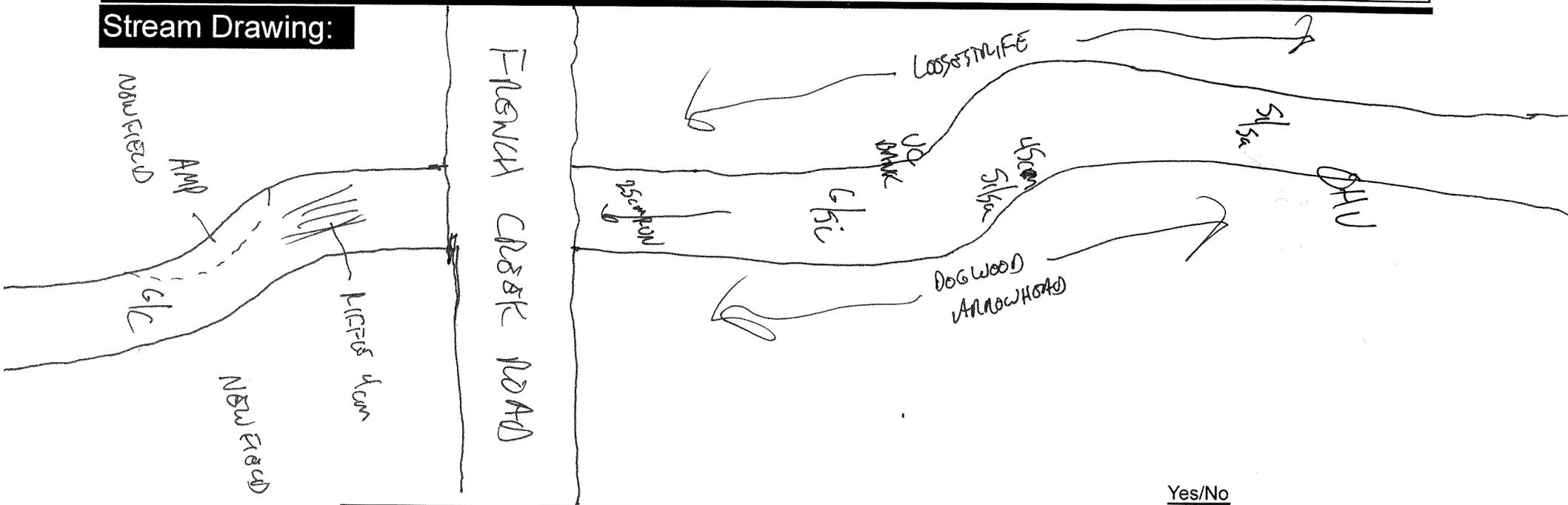
|                      |               |               |                    |                     |                |                    |                 |                    |       |
|----------------------|---------------|---------------|--------------------|---------------------|----------------|--------------------|-----------------|--------------------|-------|
|                      | Gear:         | Distance:     | Water Clarity:     | Water Stage:        | Canopy -% Open |                    |                 |                    |       |
| First Sampling Pass  | _____         | _____         | _____              | _____               | _____          |                    |                 |                    |       |
| Stream Measurements: |               |               |                    |                     |                |                    |                 |                    |       |
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Mean Depth | W/D Ratio      | Bankfull Max Depth | Floodprone Area | Entrenchment Width | Ratio |
|                      |               |               |                    |                     |                |                    |                 |                    |       |

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:  - Low,  - Moderate,  - High

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

Yes/No

Is Stream Ephemeral (no pools, totally dry or only damp spots)?

Is there water upstream? How Far: \_\_\_\_\_

Is There Water Close Downstream? How Far: \_\_\_\_\_

Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Jungbluth Ditch 3.15

Stream Segment Location: At Abbe Road

QHEI Score: 59

HHEI Score: NA

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**FIELD NOTES:**

This site is a stretch of Jungbluth Ditch that flows adjacent to Abbe Road before flowing under a bridge and to the northwest. A 6' high retaining wall along Abbe Road forms the west bank. There is virtually no vegetated buffer between the channel and the road. The channel is 8-10' wide with pools ranging in depth from 12-55 cm. Many minnows were noted along with some macroinvertebrates. Patches of emergent vegetation including purple loosestrife and willow seedlings were noted along the channel fringes. The 50'+/- buffer along the east bank separates the creek channel from the residential subdivision to the east. The wooded buffer contains large American elm trees along with green ash, boxelders, pin oak, black willow and an understory of Canada goldenrod. Tile drains were noted discharging from the residences to the east. The substrate is dominated by gravel and cobble with occasional boulders and sand. Restoration opportunities are limited due to the location, however potential sources of contamination come from Abbe Road runoff and tile drain discharge.

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**PHOTOS:**



1) Jungbluth Ditch 3.15 – Facing south along Abbe Road from bridge



2) Jungbluth Ditch 3.15 – Facing north



# Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 59

River Code: RM: 3.15 Stream: JUNGBLUTH DITCH  
 Date: 8-22-02 Location: AT ABBE ROAD  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

| TYPE                                                                | POOL RIFFLE                                                         | POOL RIFFLE                                      | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                    |
|---------------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------|------------------|------------------------------------------------------|
| <input type="checkbox"/> -BLDR /SLBS[10]                            | <input checked="" type="checkbox"/> -GRAVEL [7] <u>45</u> <u>40</u> | Check ONE (OR 2 & AVERAGE)                       |                  | Check ONE (OR 2 & AVERAGE)                           |
| <input type="checkbox"/> -BOULDER [9] <u>10</u> <u>15</u>           | <input type="checkbox"/> -SAND [6]                                  | <input type="checkbox"/> -LIMESTONE [1]          | SILT:            | <input type="checkbox"/> - SILT HEAVY [-2]           |
| <input checked="" type="checkbox"/> -COBBLE [8] <u>25</u> <u>30</u> | <input type="checkbox"/> -BEDROCK[5]                                | <input checked="" type="checkbox"/> -TILLS [1]   |                  | <input type="checkbox"/> -SILT MODERATE [-1]         |
| <input type="checkbox"/> -HARDPAN [4]                               | <input type="checkbox"/> -DETRITUS[3]                               | <input type="checkbox"/> -WETLANDS[0]            |                  | <input checked="" type="checkbox"/> -SILT NORMAL [0] |
| <input type="checkbox"/> -MUCK [2]                                  | <input type="checkbox"/> -ARTIFICIAL[0]                             | <input type="checkbox"/> -HARDPAN [0]            |                  | <input type="checkbox"/> -SILT FREE [1]              |
| <input type="checkbox"/> -SILT [2] <u>10</u> <u>15</u>              | NOTE: Ignore Sludge Originating From Point Sources                  | <input type="checkbox"/> -SANDSTONE [0] EMBEDDED |                  | <input type="checkbox"/> -EXTENSIVE [-2]             |
|                                                                     |                                                                     | <input type="checkbox"/> -RIP/RAP [0] NESS:      |                  | <input type="checkbox"/> -MODERATE [-1]              |
|                                                                     |                                                                     | <input type="checkbox"/> -LACUSTRINE [0]         |                  | <input checked="" type="checkbox"/> -NORMAL [0]      |
|                                                                     |                                                                     | <input type="checkbox"/> -SHALE [-1]             |                  | <input type="checkbox"/> -NONE [1]                   |
|                                                                     |                                                                     | <input type="checkbox"/> -COAL FINES [-2]        |                  |                                                      |

Substrate  
16  
 Max 20

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
 (High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS: \_\_\_\_\_

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)  
 (Structure) TYPE: Score All That Occur

|                                       |                            |                                   |
|---------------------------------------|----------------------------|-----------------------------------|
| <u>0</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <u>0</u> OXBOWS, BACKWATERS [1]   |
| <u>3</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <u>0</u> AQUATIC MACROPHYTES [1]  |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>2</u> BOULDERS [1]      | <u>1</u> LOGS OR WOODY DEBRIS [1] |
| <u>2</u> ROOTMATS [1]                 | COMMENTS: _____            |                                   |

AMOUNT: (Check ONLY One or check 2 and AVERAGE)  
 - EXTENSIVE > 75% [11]  
 - MODERATE 25-75% [7]  
 - SPARSE 5-25% [3]  
 - NEARLY ABSENT < 5%[1]

Cover  
10  
 Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                     | DEVELOPMENT                                    | CHANNELIZATION                                       | STABILITY                                          | MODIFICATIONS/OTHER                                                         |
|-----------------------------------------------|------------------------------------------------|------------------------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------|
| <input type="checkbox"/> - HIGH [4]           | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                  | <input type="checkbox"/> - HIGH [3]                | <input type="checkbox"/> - SNAGGING <input type="checkbox"/> - IMPOUND.     |
| <input type="checkbox"/> - MODERATE [3]       | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]             | <input checked="" type="checkbox"/> - MODERATE [2] | <input type="checkbox"/> - RELOCATION <input type="checkbox"/> - ISLANDS    |
| <input checked="" type="checkbox"/> - LOW [2] | <input checked="" type="checkbox"/> - FAIR [3] | <input checked="" type="checkbox"/> - RECOVERING [3] | <input type="checkbox"/> - LOW [1]                 | <input type="checkbox"/> - CANOPY REMOVAL <input type="checkbox"/> - LEVEED |
| <input type="checkbox"/> - NONE [1]           | <input type="checkbox"/> - POOR [1]            | <input type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                                    | <input type="checkbox"/> - DREDGING <input type="checkbox"/> - BANK SHAPING |
|                                               |                                                |                                                      |                                                    | <input checked="" type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS        |

Channel  
10  
 Max 20

COMMENTS: \_\_\_\_\_

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

| RIPARIAN WIDTH                                            |                                                                        | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)                   |                                                               | BANK EROSION                                          |                                                                                                            |
|-----------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| L R (Per Bank)                                            | L R (Most Predominant Per Bank)                                        | L R                                                             | L R                                                           | L R (Per Bank)                                        |                                                                                                            |
| <input type="checkbox"/> - WIDE > 50m [4]                 | <input type="checkbox"/> - FOREST, SWAMP [3]                           | <input type="checkbox"/> - CONSERVATION TILLAGE [1]             | <input checked="" type="checkbox"/> - URBAN OR INDUSTRIAL [0] | <input checked="" type="checkbox"/> - NONE/LITTLE [3] | Riparian<br><span style="border: 1px solid black; padding: 5px; display: inline-block;">4</span><br>Max 10 |
| <input type="checkbox"/> - MODERATE 10-50m [3]            | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]                      | <input checked="" type="checkbox"/> - OPEN PASTURE, ROWCROP [0] | <input type="checkbox"/> - MINING/CONSTRUCTION [0]            | <input type="checkbox"/> - MODERATE [2]               |                                                                                                            |
| <input type="checkbox"/> - NARROW 5-10 m [2]              | <input checked="" type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] |                                                                 |                                                               | <input type="checkbox"/> - HEAVY/SEVERE [1]           |                                                                                                            |
| <input checked="" type="checkbox"/> - VERY NARROW <5 m[1] | <input type="checkbox"/> - FENCED PASTURE [1]                          |                                                                 |                                                               |                                                       |                                                                                                            |
| <input type="checkbox"/> - NONE [0]                       |                                                                        |                                                                 |                                                               |                                                       |                                                                                                            |

COMMENTS: \_\_\_\_\_

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH                                         | MORPHOLOGY                                                          | CURRENT VELOCITY [ POOLS & RIFFLES! ]                                                  | Pool/Current                                                                                   |
|----------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| (Check 1 ONLY!)                                    | (Check 1 or 2 & AVERAGE)                                            | (Check All That Apply)                                                                 |                                                                                                |
| <input type="checkbox"/> - >1m [6]                 | <input checked="" type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> - EDDIES[1] <input type="checkbox"/> - TORRENTIAL[-1]         | <span style="border: 1px solid black; padding: 5px; display: inline-block;">5</span><br>Max 12 |
| <input type="checkbox"/> - 0.7-1m [4]              | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> - FAST[1] <input type="checkbox"/> - INTERSTITIAL[-1]         |                                                                                                |
| <input checked="" type="checkbox"/> - 0.4-0.7m [2] | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> - MODERATE [1] <input type="checkbox"/> - INTERMITTENT[-2]    |                                                                                                |
| <input type="checkbox"/> - 0.2- 0.4m [1]           |                                                                     | <input checked="" type="checkbox"/> - SLOW [1] <input type="checkbox"/> - VERY FAST[1] |                                                                                                |
| <input type="checkbox"/> - < 0.2m [POOL=0]         | COMMENTS: _____                                                     |                                                                                        |                                                                                                |

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                                | RUN DEPTH                                         | RIFFLE/RUN SUBSTRATE                                                       | RIFFLE/RUN EMBEDDEDNESS                       | Riffle/Run                                                                                                  |
|-------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> - Best Areas >10 cm [2]            | <input type="checkbox"/> - MAX > 50 [2]           | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]              | <input type="checkbox"/> - NONE [2]           | <span style="border: 1px solid black; padding: 5px; display: inline-block;">4</span><br>Max 8               |
| <input checked="" type="checkbox"/> - Best Areas 5-10 cm[1] | <input checked="" type="checkbox"/> - MAX < 50[1] | <input checked="" type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1] | <input checked="" type="checkbox"/> - LOW [1] |                                                                                                             |
| <input type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0]     |                                                   | <input type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0]                | <input type="checkbox"/> - MODERATE [0]       | Gradient<br><span style="border: 1px solid black; padding: 5px; display: inline-block;">10</span><br>Max 10 |
| COMMENTS: _____                                             |                                                   | <input type="checkbox"/> - NO RIFFLE [Metric=0]                            | <input type="checkbox"/> - EXTENSIVE [-1]     |                                                                                                             |

6] GRADIENT (ft/mi): 28.6 DRAINAGE AREA (sq.mi.): 4.7  
 %POOL: 20 %GLIDE: 40  
 %RIFFLE: 30 %RUN: 10

\* Best areas must be large enough to support a population of riffle-obligate species



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Jungbluth Ditch 4.13

Stream Segment Location: At Case Road

QHEI Score: 46.5

HHEI Score: NA

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FIELD NOTES: 22 AUG 2002

This stretch of Jungbluth Ditch is on the northeast branch that crosses Case Road north of the Camelot subdivision. The northeast bank is adjacent to a residence (lawn) and has no buffer for the first 50'. The remainder of the northeast bank as well as the southwest bank has a narrow (10-20') vegetated buffer with eastern cottonwood, black willow, red maple, green ash, multiflora rose, gray-stemmed dogwood and black cherry. There is a 6" culvert under Case Road and a 12" tile pipe discharging from the lot to the south. The channel is 2-8' wide with riprap on the northeast bank. The water depth was 10-25 cm. over a mostly hardpan and silt substrate with occasional cobbles, gravel and detritus. Rice cutgrass (emergent) and water milfoil (aquatic) were found in the channel intermittently. There are a few riffles. The ditch flows northward from Case Road through a residential area to the southeast. The ditch first flows through the Camelot subdivision where it has been rerouted and expanded into several detention/retention ponds. In addition, large areas have been underlain with culverts. This portion of the creek (subdivision) represents a significant impediment to fish/benthic habitat.

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PHOTOS:



1) Jungbluth Ditch 4.13 – On the northeast branch



2) Jungbluth Ditch 4.13 – At Case road – upstream



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 46.5

River Code: RM: 4.13 Stream: JONGBLUTH DITCH

Date: 8-22-02 Location: AT CASE ROAD

Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

| TYPE                                                         | POOL RIFFLE                                        | POOL RIFFLE                                           | SUBSTRATE ORIGIN                                    | SUBSTRATE QUALITY                                   |                                                                                                                    |
|--------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> BLDR /SLBS [10] _____               | <input type="checkbox"/> GRAVEL [7] _____          | <u>5</u> Check ONE (OR 2 & AVERAGE)                   | Check ONE (OR 2 & AVERAGE)                          |                                                     |                                                                                                                    |
| <input type="checkbox"/> BOULDER [9] <u>5</u>                | <input type="checkbox"/> SAND [6] _____            | <input type="checkbox"/> LIMESTONE [1] _____          | SILT:                                               | <input type="checkbox"/> SILT HEAVY [-2]            | Substrate                                                                                                          |
| <input type="checkbox"/> COBBLE [8] <u>5</u>                 | <input type="checkbox"/> BEDROCK [5] _____         | <input type="checkbox"/> TILLS [1] _____              | <input type="checkbox"/> SILT MODERATE [-1]         | <input type="checkbox"/> SILT MODERATE [-1]         |                                                                                                                    |
| <input checked="" type="checkbox"/> HARDPAN [4] <u>60 60</u> | <input type="checkbox"/> DETRITUS [3] <u>10 5</u>  | <input type="checkbox"/> WETLANDS [0] _____           | <input checked="" type="checkbox"/> SILT NORMAL [0] | <input checked="" type="checkbox"/> SILT NORMAL [0] | <span style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">6</span><br>Max 20 |
| <input type="checkbox"/> MUCK [2] _____                      | <input type="checkbox"/> ARTIFICIAL [0] _____      | <input checked="" type="checkbox"/> HARDPAN [0] _____ | <input type="checkbox"/> SILT FREE [1] _____        | <input type="checkbox"/> SILT FREE [1] _____        |                                                                                                                    |
| <input checked="" type="checkbox"/> SILT [2] <u>30 20</u>    | NOTE: Ignore Sludge Originating From Point Sources | <input type="checkbox"/> SANDSTONE [0] EMBEDDED       | <input type="checkbox"/> EXTENSIVE [-2]             | <input type="checkbox"/> EXTENSIVE [-2]             |                                                                                                                    |
|                                                              |                                                    | <input type="checkbox"/> RIP/RAP [0] NESS:            | <input type="checkbox"/> MODERATE [-1]              | <input type="checkbox"/> MODERATE [-1]              |                                                                                                                    |
|                                                              |                                                    | <input type="checkbox"/> LACUSTRINE [0]               | <input checked="" type="checkbox"/> NORMAL [0]      | <input checked="" type="checkbox"/> NORMAL [0]      |                                                                                                                    |
|                                                              |                                                    | <input type="checkbox"/> SHALE [-1]                   | <input type="checkbox"/> NONE [1]                   | <input type="checkbox"/> NONE [1]                   |                                                                                                                    |
|                                                              |                                                    | <input type="checkbox"/> COAL FINES [-2]              |                                                     |                                                     |                                                                                                                    |

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  3 or Less [0]

COMMENTS: \_\_\_\_\_

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| (Structure)                           | TYPE: Score All That Occur | AMOUNT: (Check ONLY One or check 2 and AVERAGE) | Cover                                                                                                               |
|---------------------------------------|----------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <u>2</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <input type="checkbox"/> EXTENSIVE > 75% [11]   | <span style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">11</span><br>Max 20 |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <input type="checkbox"/> MODERATE 25-75% [7]    |                                                                                                                     |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>1</u> BOULDERS [1]      | <input type="checkbox"/> SPARSE 5-25% [3]       |                                                                                                                     |
| <u>2</u> ROOTMATS [1]                 | COMMENTS: _____            | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |                                                                                                                     |

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                   | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY                                   | MODIFICATIONS/OTHER                                                                | Channel                                                                                                            |
|---------------------------------------------|----------------------------------------------|----------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> HIGH [4]           | <input type="checkbox"/> EXCELLENT [7]       | <input type="checkbox"/> NONE [6]                  | <input type="checkbox"/> HIGH [3]           | <input type="checkbox"/> SNAGGING <input type="checkbox"/> IMPOUND.                | <span style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">9</span><br>Max 20 |
| <input type="checkbox"/> MODERATE [3]       | <input type="checkbox"/> GOOD [5]            | <input type="checkbox"/> RECOVERED [4]             | <input type="checkbox"/> MODERATE [2]       | <input checked="" type="checkbox"/> RELOCATION <input type="checkbox"/> ISLANDS    |                                                                                                                    |
| <input checked="" type="checkbox"/> LOW [2] | <input checked="" type="checkbox"/> FAIR [3] | <input checked="" type="checkbox"/> RECOVERING [3] | <input checked="" type="checkbox"/> LOW [1] | <input type="checkbox"/> CANOPY REMOVAL <input type="checkbox"/> LEVEED            |                                                                                                                    |
| <input type="checkbox"/> NONE [1]           | <input type="checkbox"/> POOR [1]            | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                             | <input type="checkbox"/> DREDGING <input checked="" type="checkbox"/> BANK SHAPING |                                                                                                                    |
|                                             |                                              |                                                    |                                             | <input checked="" type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS                 |                                                                                                                    |

COMMENTS: \_\_\_\_\_

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) <sup>P</sup> River Right Looking Downstream <sup>P</sup>

| RIPARIAN WIDTH                                           |                                                                      | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)      |                                                  | BANK EROSION                                     |  | Riparian                                                                                                               |
|----------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------|
| L R (Per Bank)                                           | L R (Most Predominant Per Bank)                                      | L R                                                | L R                                              | L R (Per Bank)                                   |  |                                                                                                                        |
| <input type="checkbox"/> WIDE > 50m [4]                  | <input type="checkbox"/> FOREST, SWAMP [3]                           | <input type="checkbox"/> CONSERVATION TILLAGE [1]  | <input type="checkbox"/> URBAN OR INDUSTRIAL [0] | <input type="checkbox"/> NONE/LITTLE [3]         |  | <span style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">4 1/2</span><br>Max 10 |
| <input type="checkbox"/> MODERATE 10-50m [3]             | <input type="checkbox"/> SHRUB OR OLD FIELD [2]                      | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] | <input type="checkbox"/> MINING/CONSTRUCTION [0] | <input checked="" type="checkbox"/> MODERATE [2] |  |                                                                                                                        |
| <input type="checkbox"/> NARROW 5-10 m [2]               | <input checked="" type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] |                                                    |                                                  | <input type="checkbox"/> HEAVY/SEVERE [1]        |  |                                                                                                                        |
| <input checked="" type="checkbox"/> VERY NARROW <5 m [1] | <input type="checkbox"/> FENCED PASTURE [1]                          |                                                    |                                                  |                                                  |  |                                                                                                                        |
| <input type="checkbox"/> NONE [0]                        |                                                                      |                                                    |                                                  |                                                  |  |                                                                                                                        |

COMMENTS: \_\_\_\_\_

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                       | MORPHOLOGY (Check 1 or 2 & AVERAGE)                               | CURRENT VELOCITY [ POOLS & RIFFLES! ] (Check All That Apply)                        | Pool/Current                                                                                                       |
|--------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> >1m [6]                 | <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]            | <input type="checkbox"/> EDDIES [1] <input type="checkbox"/> TORRENTIAL [-1]        | <span style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">3</span><br>Max 12 |
| <input type="checkbox"/> 0.7-1m [4]              | <input checked="" type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> FAST [1] <input type="checkbox"/> INTERSTITIAL [-1]        |                                                                                                                    |
| <input type="checkbox"/> 0.4-0.7m [2]            | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> MODERATE [1] <input type="checkbox"/> INTERMITTENT [-2]    |                                                                                                                    |
| <input checked="" type="checkbox"/> 0.2-0.4m [1] |                                                                   | <input checked="" type="checkbox"/> SLOW [1] <input type="checkbox"/> VERY FAST [1] |                                                                                                                    |
| <input type="checkbox"/> < 0.2m [POOL=0]         | COMMENTS: _____                                                   |                                                                                     |                                                                                                                    |

COMMENTS: \_\_\_\_\_

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                               | RUN DEPTH                                        | RIFFLE/RUN SUBSTRATE                                                 | RIFFLE/RUN EMBEDDEDNESS                     | Riffle/Run                                                                                                                      |
|------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Best Areas >10 cm [2]             | <input type="checkbox"/> MAX > 50 [2]            | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]          | <input type="checkbox"/> NONE [2]           | <span style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">3</span><br>Max 8               |
| <input checked="" type="checkbox"/> Best Areas 5-10 cm [1] | <input checked="" type="checkbox"/> MAX < 50 [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]        | <input checked="" type="checkbox"/> LOW [1] |                                                                                                                                 |
| <input type="checkbox"/> Best Areas < 5 cm [RIFFLE=0]      |                                                  | <input checked="" type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0] | <input type="checkbox"/> MODERATE [0]       | Gradient<br><span style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;">10</span><br>Max 10 |
| COMMENTS: _____                                            |                                                  | <input type="checkbox"/> NO RIFFLE [Metric=0]                        | <input type="checkbox"/> EXTENSIVE [-1]     |                                                                                                                                 |

6) GRADIENT (ft/mi): 25 DRAINAGE AREA (sq.mi.): 2.8

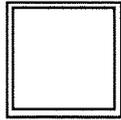
%POOL: 20 %GLIDE: 60

%RIFFLE: 10 %RUN: 10

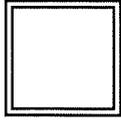
\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_



Subjective Rating (1-10)



Aesthetic Rating (1-10)

Gradient:

- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open: \_\_\_\_\_

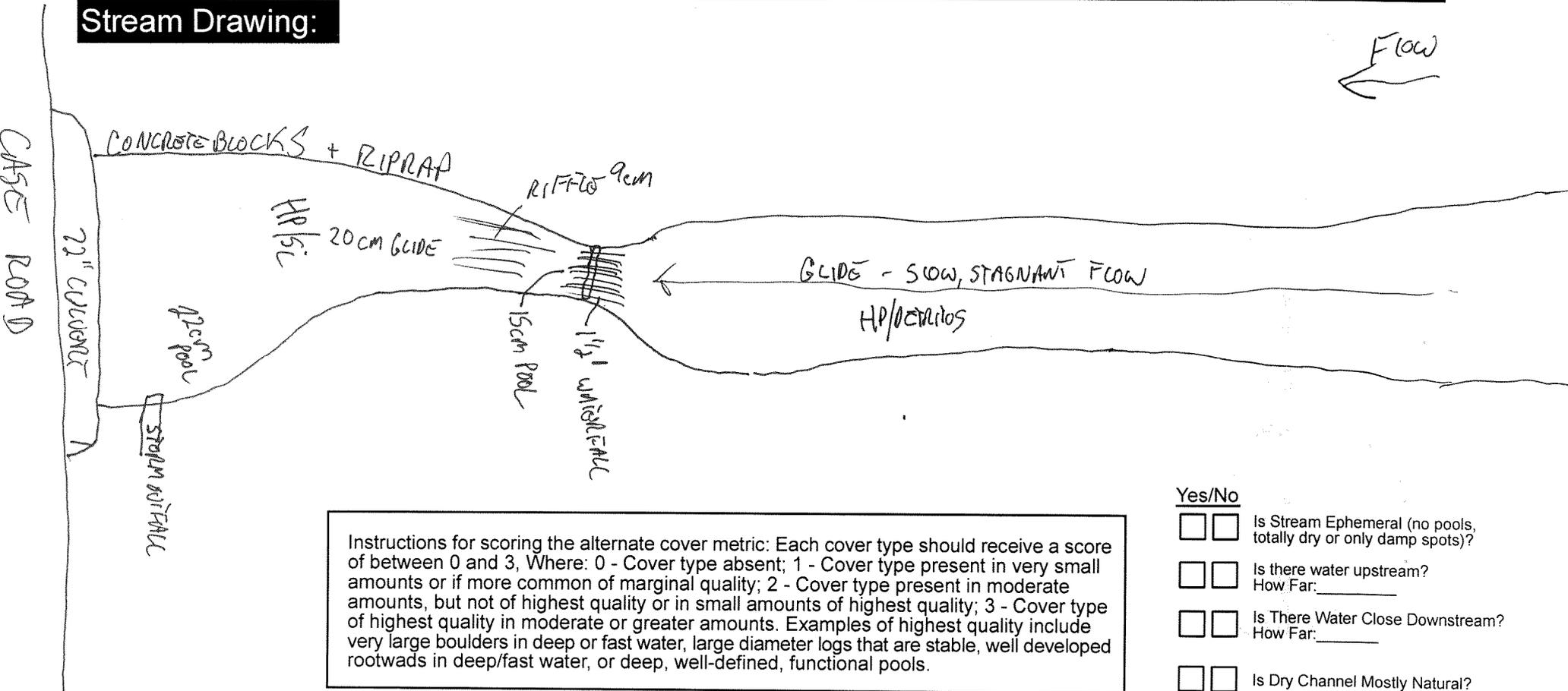
First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Mean Depth | W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|---------------------|-----------|--------------------|-----------------|-----------------|
|               |               |               |                    |                     |           |                    |                 |                 |

**Stream Drawing:**

Flow ←



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

**WALKER DITCH NOTES**

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Walker Ditch 0.0  
Stream Segment Location: Mouth of Ditch (French Creek RM 1.23)  
QHEI Score: 66.5 HHEI Score: NA

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FIELD NOTES: 20 AUG 2002

Walker Ditch (a.k.a. Fish Creek) enters French Creek from the south and east. There is a 40' bank on the south side of this stretch and a 15-20' high bank on the north side. Both sides contain forested buffers (50' wide to south; 100' wide to north) dominated by sugar maple with occurrences of eastern cottonwood, red oak, black cherry, and American hornbeam. The substrate is dominated by gravel overlaying bedrock, with lesser amounts of boulders and sand. There appears to be less biological activity than in Jungbluth Ditch.

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PHOTOS:



1) Walker Ditch 0.0 – Facing upstream (200' from mouth)



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **66.5**

River Code: RM: 0.0 Stream: WALKER DITCH

Date: 8-20-02 Location: AT MOUTH OF FRENCH CREEK CONFLUENCE

Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                                     | POOL RIFFLE                                                         | POOL RIFFLE                                     | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                 |
|----------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------|------------------|---------------------------------------------------|
| <input type="checkbox"/> BLDR /SLBS [10]                 | <input checked="" type="checkbox"/> GRAVEL [7] <u>30</u> <u>30</u>  | Check ONE (OR 2 & AVERAGE)                      |                  | Check ONE (OR 2 & AVERAGE)                        |
| <input type="checkbox"/> BOULDER [9] <u>10</u> <u>10</u> | <input type="checkbox"/> SAND [6] <u>5</u> <u>5</u>                 | <input type="checkbox"/> LIMESTONE [1]          | SILT:            | <input type="checkbox"/> SILT HEAVY [-2]          |
| <input type="checkbox"/> COBBLE [8] <u>10</u> <u>10</u>  | <input checked="" type="checkbox"/> BEDROCK [5] <u>45</u> <u>45</u> | <input type="checkbox"/> TILLS [1]              |                  | <input type="checkbox"/> SILT MODERATE [-1]       |
| <input type="checkbox"/> HARDPAN [4]                     | <input type="checkbox"/> DETRITUS [3]                               | <input type="checkbox"/> WETLANDS [0]           |                  | <input type="checkbox"/> SILT NORMAL [0]          |
| <input type="checkbox"/> MUCK [2]                        | <input type="checkbox"/> ARTIFICIAL [0]                             | <input type="checkbox"/> HARDPAN [0]            |                  | <input checked="" type="checkbox"/> SILT FREE [1] |
| <input type="checkbox"/> SILT [2]                        | NOTE: Ignore Sludge Originating From Point Sources                  | <input type="checkbox"/> SANDSTONE [0] EMBEDDED |                  | <input type="checkbox"/> EXTENSIVE [-2]           |
|                                                          |                                                                     | <input type="checkbox"/> RIP/RAP [0] NESS:      |                  | <input type="checkbox"/> MODERATE [-1]            |
|                                                          |                                                                     | <input type="checkbox"/> LACUSTRINE [0]         |                  | <input type="checkbox"/> NORMAL [0]               |
|                                                          |                                                                     | <input checked="" type="checkbox"/> SHALE [-1]  |                  | <input checked="" type="checkbox"/> NONE [1]      |
|                                                          |                                                                     | <input type="checkbox"/> COAL FINES [-2]        |                  |                                                   |

Substrate  
**15**  
Max 20

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
(High Quality Only, Score 5 or >)

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| TYPE                                  | Score All That Occur       | AMOUNT: (Check ONLY One or check 2 and AVERAGE) |
|---------------------------------------|----------------------------|-------------------------------------------------|
| <u>1</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <input type="checkbox"/> EXTENSIVE > 75% [11]   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>1</u> ROOTWADS [1]      | <input type="checkbox"/> MODERATE 25-75% [7]    |
| <u>1</u> SHALLOWS (IN SLOW WATER) [1] | <u>1</u> BOULDERS [1]      | <input type="checkbox"/> SPARSE 5-25% [3]       |
| <u>2</u> ROOTMATS [1]                 |                            | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |

Cover  
**10**  
Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

| SINUOSITY                                   | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY                                        | MODIFICATIONS/OTHER                                     |
|---------------------------------------------|----------------------------------------------|----------------------------------------------------|--------------------------------------------------|---------------------------------------------------------|
| <input type="checkbox"/> HIGH [4]           | <input type="checkbox"/> EXCELLENT [7]       | <input checked="" type="checkbox"/> NONE [6]       | <input type="checkbox"/> HIGH [3]                | <input type="checkbox"/> SNAGGING                       |
| <input type="checkbox"/> MODERATE [3]       | <input type="checkbox"/> GOOD [5]            | <input type="checkbox"/> RECOVERED [4]             | <input checked="" type="checkbox"/> MODERATE [2] | <input type="checkbox"/> RELOCATION                     |
| <input checked="" type="checkbox"/> LOW [2] | <input checked="" type="checkbox"/> FAIR [3] | <input type="checkbox"/> RECOVERING [3]            | <input type="checkbox"/> LOW [1]                 | <input type="checkbox"/> CANOPY REMOVAL                 |
| <input type="checkbox"/> NONE [1]           | <input type="checkbox"/> POOR [1]            | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                                  | <input type="checkbox"/> LEVEED                         |
|                                             |                                              |                                                    |                                                  | <input type="checkbox"/> DREDGING                       |
|                                             |                                              |                                                    |                                                  | <input type="checkbox"/> BANK SHAPING                   |
|                                             |                                              |                                                    |                                                  | <input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS |

Channel  
**13**  
Max 20

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

| RIPARIAN WIDTH                                     | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)             | BANK EROSION                                        |
|----------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------|
| L R (Per Bank)                                     | L R (Most Predominant Per Bank)                           | L R (Per Bank)                                      |
| <input checked="" type="checkbox"/> WIDE > 50m [4] | <input checked="" type="checkbox"/> FOREST, SWAMP [3]     | <input checked="" type="checkbox"/> NONE/LITTLE [3] |
| <input type="checkbox"/> MODERATE 10-50m [3]       | <input type="checkbox"/> SHRUB OR OLD FIELD [2]           | <input type="checkbox"/> MODERATE [2]               |
| <input type="checkbox"/> NARROW 5-10 m [2]         | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> HEAVY/SEVERE [1]           |
| <input type="checkbox"/> VERY NARROW <5 m [1]      | <input type="checkbox"/> FENCED PASTURE [1]               |                                                     |
| <input type="checkbox"/> NONE [0]                  |                                                           |                                                     |

Riparian  
**9 1/2**  
Max 10

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                       | MORPHOLOGY (Check 1 or 2 & AVERAGE)                               | CURRENT VELOCITY (Check All That Apply)          |
|--------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------|
| <input type="checkbox"/> >1m [6]                 | <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> EDDIES [1]              |
| <input type="checkbox"/> 0.7-1m [4]              | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> TORRENTIAL [-1]         |
| <input type="checkbox"/> 0.4-0.7m [2]            | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> FAST [1]                |
| <input checked="" type="checkbox"/> 0.2-0.4m [1] |                                                                   | <input checked="" type="checkbox"/> MODERATE [1] |
| <input type="checkbox"/> < 0.2m [POOL=0]         |                                                                   | <input checked="" type="checkbox"/> SLOW [1]     |
|                                                  |                                                                   | <input type="checkbox"/> INTERSTITIAL [-1]       |
|                                                  |                                                                   | <input type="checkbox"/> INTERMITTENT [-2]       |
|                                                  |                                                                   | <input type="checkbox"/> VERY FAST [1]           |

Pool/Current  
**5**  
Max 12

| CHECK ONE OR CHECK 2 AND AVERAGE                          |                                                  |                                                                          |
|-----------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------|
| RIFFLE DEPTH                                              | RUN DEPTH                                        | RIFFLE/RUN SUBSTRATE                                                     |
| <input checked="" type="checkbox"/> Best Areas >10 cm [2] | <input type="checkbox"/> MAX > 50 [2]            | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]              |
| <input type="checkbox"/> Best Areas 5-10 cm [1]           | <input checked="" type="checkbox"/> MAX < 50 [1] | <input checked="" type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] |
| <input type="checkbox"/> Best Areas < 5 cm [RIFFLE=0]     |                                                  | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]                |
|                                                           |                                                  | <input type="checkbox"/> RIFFLE/RUN EMBEDDEDNESS                         |
|                                                           |                                                  | <input checked="" type="checkbox"/> NONE [2]                             |
|                                                           |                                                  | <input type="checkbox"/> LOW [1]                                         |
|                                                           |                                                  | <input type="checkbox"/> MODERATE [0]                                    |
|                                                           |                                                  | <input type="checkbox"/> EXTENSIVE [-1]                                  |
|                                                           |                                                  | <input type="checkbox"/> NO RIFFLE [Metric=0]                            |

Riffle/Run  
**6**  
Max 8

Gradient  
**8**  
Max 10

6] GRADIENT (ft/mi): 30.3 DRAINAGE AREA (sq.mi.): 2.9  
%POOL: 20 %GLIDE: 40  
%RIFFLE: 20 %RUN: 20

\*\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                     |       |           |                |              |                |
|---------------------|-------|-----------|----------------|--------------|----------------|
|                     | Gear: | Distance: | Water Clarity: | Water Stage: | Canopy -% Open |
| First Sampling Pass | _____ | _____     | _____          | _____        | _____          |

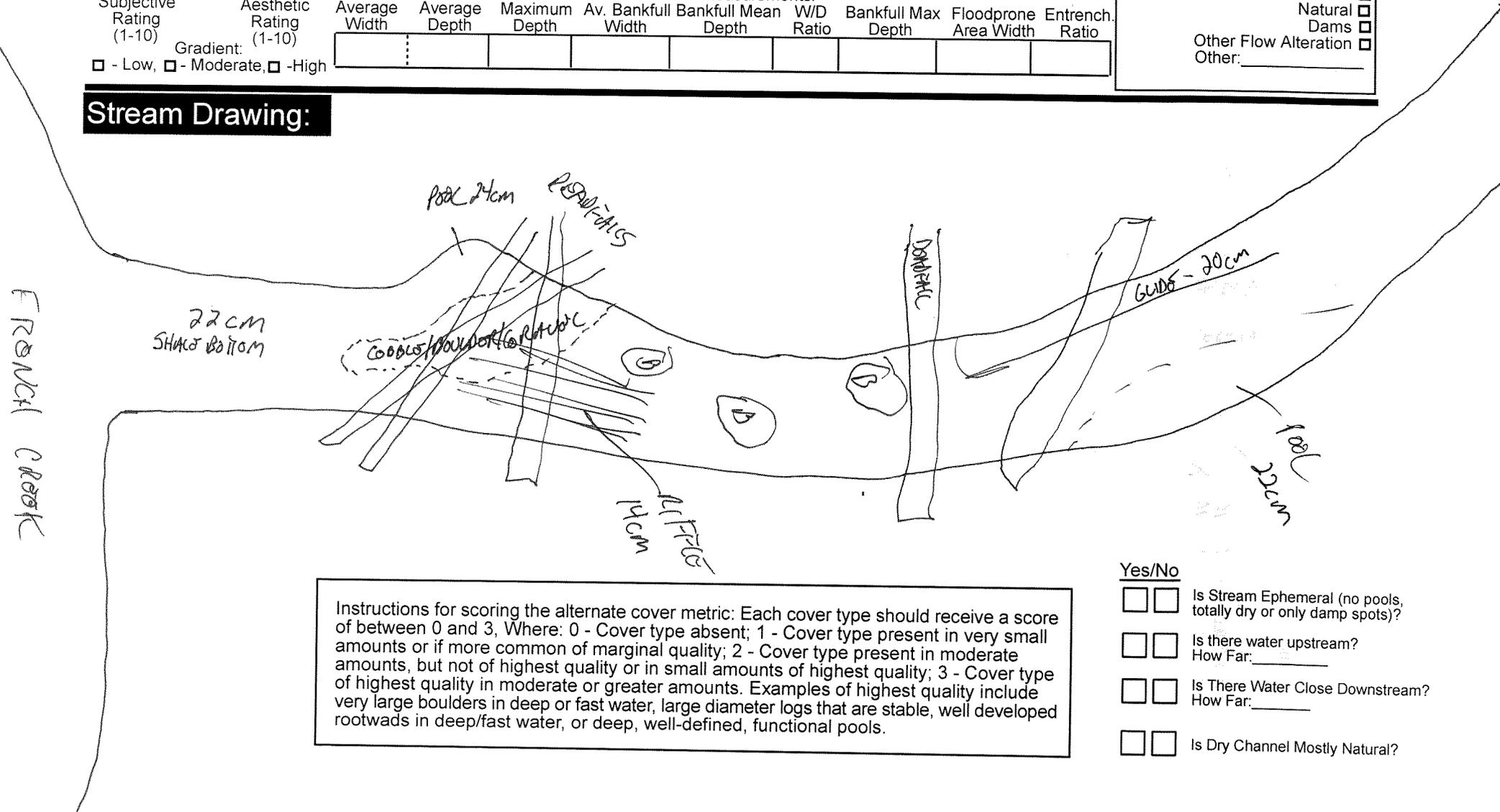
| Stream Measurements: |               |               |                    |                |                     |           |                    |                 |                 |
|----------------------|---------------|---------------|--------------------|----------------|---------------------|-----------|--------------------|-----------------|-----------------|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Bankfull Mean Depth | W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio |
|                      |               |               |                    |                |                     |           |                    |                 |                 |

Subjective Rating (1-10)  - Low,  - Moderate,  - High

Aesthetic Rating (1-10)  - Low,  - Moderate,  - High

Gradient: \_\_\_\_\_

**Stream Drawing:**



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Walker Ditch 0.6  
Stream Segment Location: At end of FCNP Hiking Trail  
QHEI Score: 67 HHEI Score: NA

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FIELD NOTES: 20 AUG 2002

This section of Walker Ditch is located off a trail in French Creek Reservation Park. The substrate is dominated by gravel and sand with bedrock, silt, boulders and cobbles. The banks range from 2-15' in height. The wide, mature forested upland riparian area is dominated by sugar maple with red oak, black cherry, cottonwood and beech. Frogs, macroinvertebrates and deer were noted. Glyceria was noted on the fringes of the creek channel. A red cardinal flower was noted on a gravel bar.

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PHOTOS:



1) Walker Ditch 0.6 – Facing upstream from trail



2) Walker Ditch 0.6 – Facing downstream from trail



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **67**

River Code: RM: 0.6 Stream: WACKER DITCH  
 Date: 8-20-02 Location: AT END OF FRENCH CREEK RESERVATION NATURE TRAIL  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                                         | POOL RIFFLE         | POOL RIFFLE                                        | SUBSTRATE ORIGIN                               | SUBSTRATE QUALITY                                   |
|--------------------------------------------------------------|---------------------|----------------------------------------------------|------------------------------------------------|-----------------------------------------------------|
| <input type="checkbox"/> BLDR /SLBS [10]                     |                     | <input checked="" type="checkbox"/> GRAVEL [7]     | <u>30</u> <u>30</u> Check ONE (OR 2 & AVERAGE) | Check ONE (OR 2 & AVERAGE)                          |
| <input type="checkbox"/> BOULDER [9]                         | <u>5</u> <u>5</u>   | <input checked="" type="checkbox"/> SAND [6]       | <u>25</u> <u>25</u>                            | <input type="checkbox"/> SILT HEAVY [-2]            |
| <input type="checkbox"/> COBBLE [8]                          | <u>10</u> <u>10</u> | <input type="checkbox"/> BEDROCK [5]               | <u>15</u> <u>15</u>                            | <input type="checkbox"/> SILT MODERATE [-1]         |
| <input type="checkbox"/> HARDPAN [4]                         |                     | <input type="checkbox"/> DETRITUS [3]              |                                                | <input checked="" type="checkbox"/> SILT NORMAL [0] |
| <input type="checkbox"/> MUCK [2]                            |                     | <input type="checkbox"/> ARTIFICIAL [0]            |                                                | <input type="checkbox"/> SILT FREE [1]              |
| <input type="checkbox"/> SILT [2]                            | <u>15</u> <u>15</u> | NOTE: Ignore Sludge Originating From Point Sources |                                                | <input type="checkbox"/> EXTENSIVE [-2]             |
| -----                                                        |                     |                                                    |                                                |                                                     |
| NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >) |                     |                                                    |                                                |                                                     |
| <input checked="" type="checkbox"/> 4 or More [2]            |                     |                                                    |                                                |                                                     |
| <input type="checkbox"/> 3 or Less [0]                       |                     |                                                    |                                                |                                                     |
| COMMENTS: _____                                              |                     |                                                    |                                                |                                                     |

Substrate  
**16**  
Max 20

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| (Structure)                           | TYPE: Score All That Occur | AMOUNT: (Check ONLY One or check 2 and AVERAGE) |
|---------------------------------------|----------------------------|-------------------------------------------------|
| <u>2</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <input type="checkbox"/> EXTENSIVE > 75% [11]   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>1</u> ROOTWADS [1]      | <input type="checkbox"/> MODERATE 25-75% [7]    |
| <u>1</u> SHALLOWS (IN SLOW WATER) [1] | <u>2</u> BOULDERS [1]      | <input type="checkbox"/> SPARSE 5-25% [3]       |
| <u>1</u> ROOTMATS [1]                 | COMMENTS: _____            | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |

Cover  
**11**  
Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

| SINUOSITY                                        | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY                                        | MODIFICATIONS/OTHER                                     |
|--------------------------------------------------|----------------------------------------------|----------------------------------------------------|--------------------------------------------------|---------------------------------------------------------|
| <input type="checkbox"/> HIGH [4]                | <input type="checkbox"/> EXCELLENT [7]       | <input checked="" type="checkbox"/> NONE [6]       | <input type="checkbox"/> HIGH [3]                | <input type="checkbox"/> SNAGGING                       |
| <input checked="" type="checkbox"/> MODERATE [3] | <input type="checkbox"/> GOOD [5]            | <input type="checkbox"/> RECOVERED [4]             | <input checked="" type="checkbox"/> MODERATE [2] | <input type="checkbox"/> RELOCATION                     |
| <input type="checkbox"/> LOW [2]                 | <input checked="" type="checkbox"/> FAIR [3] | <input type="checkbox"/> RECOVERING [3]            | <input type="checkbox"/> LOW [1]                 | <input type="checkbox"/> CANOPY REMOVAL                 |
| <input type="checkbox"/> NONE [1]                | <input type="checkbox"/> POOR [1]            | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                                  | <input type="checkbox"/> DREDGING                       |
|                                                  |                                              |                                                    |                                                  | <input type="checkbox"/> BANK SHAPING                   |
|                                                  |                                              |                                                    |                                                  | <input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS |

Channel  
**14**  
Max 20

COMMENTS: \_\_\_\_\_

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

| RIPARIAN WIDTH                                     | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)             | BANK EROSION                                     |
|----------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------|
| L R (Per Bank)                                     | L R (Most Predominant Per Bank)                           | L R (Per Bank)                                   |
| <input checked="" type="checkbox"/> WIDE > 50m [4] | <input checked="" type="checkbox"/> FOREST, SWAMP [3]     | <input type="checkbox"/> NONE/LITTLE [3]         |
| <input type="checkbox"/> MODERATE 10-50m [3]       | <input type="checkbox"/> SHRUB OR OLD FIELD [2]           | <input checked="" type="checkbox"/> MODERATE [2] |
| <input type="checkbox"/> NARROW 5-10 m [2]         | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> HEAVY/SEVERE [1]        |
| <input type="checkbox"/> VERY NARROW <5 m [1]      | <input type="checkbox"/> FENCED PASTURE [1]               |                                                  |
| <input type="checkbox"/> NONE [0]                  |                                                           |                                                  |

Riparian  
**9**  
Max 10

COMMENTS: \_\_\_\_\_

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                          | MORPHOLOGY (Check 1 or 2 & AVERAGE)                            | CURRENT VELOCITY (POOLS & RIFFLES!) (Check All That Apply) |
|-----------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> >1m [6]                    | <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]         | <input type="checkbox"/> EDDIES [1]                        |
| <input type="checkbox"/> 0.7-1m [4]                 | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]         | <input type="checkbox"/> TORRENTIAL [-1]                   |
| <input type="checkbox"/> 0.4-0.7m [2]               | <input checked="" type="checkbox"/> POOL WIDTH < RIFFLE W. [0] | <input type="checkbox"/> INTERSTITIAL [-1]                 |
| <input type="checkbox"/> 0.2-0.4m [1]               |                                                                | <input checked="" type="checkbox"/> MODERATE [1]           |
| <input checked="" type="checkbox"/> < 0.2m [POOL=0] | COMMENTS: _____                                                | <input checked="" type="checkbox"/> SLOW [1]               |
|                                                     |                                                                | <input type="checkbox"/> VERY FAST [1]                     |

Pool/Current  
**2**  
Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                              | RUN DEPTH                                        | RIFFLE/RUN SUBSTRATE                                                     | RIFFLE/RUN EMBEDDEDNESS                     |
|-----------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------|
| <input checked="" type="checkbox"/> Best Areas >10 cm [2] | <input type="checkbox"/> MAX > 50 [2]            | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]              | <input type="checkbox"/> NONE [2]           |
| <input type="checkbox"/> Best Areas 5-10 cm [1]           | <input checked="" type="checkbox"/> MAX < 50 [1] | <input checked="" type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input checked="" type="checkbox"/> LOW [1] |
| <input type="checkbox"/> Best Areas < 5 cm [RIFFLE=0]     |                                                  | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]                | <input type="checkbox"/> MODERATE [0]       |
| COMMENTS: _____                                           |                                                  |                                                                          | <input type="checkbox"/> EXTENSIVE [-1]     |
|                                                           |                                                  | <input type="checkbox"/> NO RIFFLE [Metric=0]                            |                                             |

Riffle/Run  
**5**  
Max 8  
Gradient  
**10**  
Max 10

6) GRADIENT (ft/mi): 18.5 DRAINAGE AREA (sq.mi.): 2.8  
 %POOL: 25 %GLIDE: 10  
 %RIFFLE: 35 %RUN: 30

\* Best areas must be large enough to support a population of riffle-obligate species



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Walker Ditch 1.7

Stream Segment Location: At Abbe Road

QHEI Score: 23

HHEI Score: NA

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FIELD NOTES: 21 AUG 2002

This site is located on the west side of Abbe Road immediately north of the railroad tracks. This section of Walker Ditch has been channelized. The channel width is 12' and the water depth averages 15 cm. The channel contains emergent vegetation including duck potato, arrowhead, soft-stem bulrush, sedges and rushes. The south bank has a 15'+/- wide shrub/old field buffer between the channel and railroad tracks. A soybean field is located to the south of the railroad tracks. The north side has a shrub/old field area. Both buffers contain species including gray-stemmed dogwood and Canada goldenrod. A subclimax forest is located 30' +/- to the north of the channel on the north side. This forest contains green ash and red maple. Approximately 400' west of Abbe Road, a residential subdivision replaces the forested area on the north side. Tadpoles and macroinvertebrates were noted in the ditch. The substrate is dominated by silt and muck. Considering the location, this section of the ditch is in remarkably good shape, as there are very few occurrences of invasive species.

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PHOTOS:



1) Walker Ditch 1.7 – Facing downstream from Abbe Road



2) Walker Ditch 1.7 – Facing upstream

River Code: RM: 1.7 Stream: WALKER DITCH  
Date: 8-21-02 Location: AT ABBE ROAD  
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                                              | POOL RIFFLE                                               | POOL RIFFLE                                      | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                    |
|-------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------|------------------|------------------------------------------------------|
| <input type="checkbox"/> -BLDR /SLBS[10]                          | <input type="checkbox"/> -GRAVEL [7]                      | Check ONE (OR 2 & AVERAGE)                       |                  | Check ONE (OR 2 & AVERAGE)                           |
| <input type="checkbox"/> -BOULDER [9]                             | <input type="checkbox"/> -SAND [6]                        | <input type="checkbox"/> -LIMESTONE [1]          | SILT:            | <input checked="" type="checkbox"/> -SILT HEAVY [-2] |
| <input type="checkbox"/> -COBBLE [8]                              | <input type="checkbox"/> -BEDROCK[5]                      | <input type="checkbox"/> -TILLS [1]              |                  | <input type="checkbox"/> -SILT MODERATE [-1]         |
| <input type="checkbox"/> -HARDPAN [4]                             | <input type="checkbox"/> -DETRITUS[3] <u>20</u> <u>20</u> | <input checked="" type="checkbox"/> -WETLANDS[0] |                  | <input type="checkbox"/> -SILT NORMAL [0]            |
| <input checked="" type="checkbox"/> -MUCK [2] <u>40</u> <u>40</u> | <input type="checkbox"/> -ARTIFICIAL[0]                   | <input type="checkbox"/> -HARDPAN [0]            |                  | <input type="checkbox"/> -SILT FREE [1]              |
| <input checked="" type="checkbox"/> -SILT [2] <u>40</u> <u>40</u> | NOTE: Ignore Sludge Originating From Point Sources        | <input type="checkbox"/> -SANDSTONE [0] EMBEDDED |                  | <input checked="" type="checkbox"/> -EXTENSIVE [-2]  |
|                                                                   |                                                           | <input type="checkbox"/> -RIP/RAP [0] NESS:      |                  | <input type="checkbox"/> -MODERATE [-1]              |
|                                                                   |                                                           | <input type="checkbox"/> -LACUSTRINE [0]         |                  | <input type="checkbox"/> -NORMAL [0]                 |
|                                                                   |                                                           | <input type="checkbox"/> -SHALE [-1]             |                  | <input type="checkbox"/> -NONE [1]                   |
|                                                                   |                                                           | <input type="checkbox"/> -COAL FINES [-2]        |                  |                                                      |

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  3 or Less [0]

COMMENTS: \_\_\_\_\_

Substrate  
0  
Max 20

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| TYPE: Score All That Occur            | AMOUNT: (Check ONLY One or check 2 and AVERAGE)   |
|---------------------------------------|---------------------------------------------------|
| <u>0</u> UNDERCUT BANKS [1]           | <input type="checkbox"/> - EXTENSIVE > 75% [11]   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <input type="checkbox"/> - MODERATE 25-75% [7]    |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <input type="checkbox"/> - SPARSE 5-25% [3]       |
| <u>0</u> ROOTMATS [1]                 | <input type="checkbox"/> - NEARLY ABSENT < 5% [1] |
| <u>0</u> POOLS > 70 cm [2]            |                                                   |
| <u>0</u> ROOTWADS [1]                 |                                                   |
| <u>2</u> AQUATIC MACROPHYTES [1]      |                                                   |
| <u>0</u> BOULDERS [1]                 |                                                   |
| <u>0</u> OXBOWS, BACKWATERS [1]       |                                                   |
| <u>2</u> LOGS OR WOODY DEBRIS [1]     |                                                   |

COMMENTS: \_\_\_\_\_

Cover  
6  
Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                      | DEVELOPMENT                                    | CHANNELIZATION                                                  | STABILITY                                     | MODIFICATIONS/OTHER                                                                    |
|------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------|
| <input type="checkbox"/> - HIGH [4]            | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                             | <input type="checkbox"/> - HIGH [3]           | <input type="checkbox"/> - SNAGGING <input type="checkbox"/> - IMPOUND.                |
| <input type="checkbox"/> - MODERATE [3]        | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]                        | <input type="checkbox"/> - MODERATE [2]       | <input checked="" type="checkbox"/> - RELOCATION <input type="checkbox"/> - ISLANDS    |
| <input type="checkbox"/> - LOW [2]             | <input type="checkbox"/> - FAIR [3]            | <input type="checkbox"/> - RECOVERING [3]                       | <input checked="" type="checkbox"/> - LOW [1] | <input type="checkbox"/> - CANOPY REMOVAL <input type="checkbox"/> - LEVEED            |
| <input checked="" type="checkbox"/> - NONE [1] | <input checked="" type="checkbox"/> - POOR [1] | <input checked="" type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                               | <input type="checkbox"/> - DREDGING <input checked="" type="checkbox"/> - BANK SHAPING |
|                                                |                                                |                                                                 |                                               | <input type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS                              |

COMMENTS: \_\_\_\_\_

Channel  
4  
Max 20

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

| RIPARIAN WIDTH                                              | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)                   | BANK EROSION                                          |
|-------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------|
| L R (Per Bank)                                              | L R (Most Predominant Per Bank)                                 | L R (Per Bank)                                        |
| <input type="checkbox"/> - WIDE > 50m [4]                   | <input type="checkbox"/> - FOREST, SWAMP [3]                    | <input checked="" type="checkbox"/> - NONE/LITTLE [3] |
| <input checked="" type="checkbox"/> - MODERATE 10-50m [3]   | <input checked="" type="checkbox"/> - SHRUB OR OLD FIELD [2]    | <input type="checkbox"/> - MODERATE [2]               |
| <input type="checkbox"/> - NARROW 5-10 m [2]                | <input type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1]     | <input type="checkbox"/> - HEAVY/SEVERE [1]           |
| <input checked="" type="checkbox"/> - VERY NARROW < 5 m [1] | <input type="checkbox"/> - FENCED PASTURE [1]                   |                                                       |
| <input type="checkbox"/> - NONE [0]                         |                                                                 |                                                       |
|                                                             | <input type="checkbox"/> - CONSERVATION TILLAGE [1]             |                                                       |
|                                                             | <input checked="" type="checkbox"/> - URBAN OR INDUSTRIAL [0]   |                                                       |
|                                                             | <input checked="" type="checkbox"/> - OPEN PASTURE, ROWCROP [0] |                                                       |
|                                                             | <input type="checkbox"/> - MINING/CONSTRUCTION [0]              |                                                       |

COMMENTS: \_\_\_\_\_

Riparian  
5  
Max 10

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                          | MORPHOLOGY (Check 1 or 2 & AVERAGE)                                 | CURRENT VELOCITY (POOLS & RIFFLES!) (Check All That Apply)                                      |
|-----------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> - >1m [6]                  | <input checked="" type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> - EDDIES [1] <input type="checkbox"/> - TORRENTIAL [-1]                |
| <input type="checkbox"/> - 0.7-1m [4]               | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> - FAST [1] <input type="checkbox"/> - INTERSTITIAL [-1]                |
| <input type="checkbox"/> - 0.4-0.7m [2]             | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> - MODERATE [1] <input checked="" type="checkbox"/> - INTERMITTENT [-2] |
| <input checked="" type="checkbox"/> - 0.2- 0.4m [1] |                                                                     | <input checked="" type="checkbox"/> - SLOW [1] <input type="checkbox"/> - VERY FAST [1]         |
| <input type="checkbox"/> - < 0.2m [POOL=0]          |                                                                     |                                                                                                 |

COMMENTS: VEGETATED CHANNEL w/ slow and/or STAGNANT FLOW

Pool/Current  
2  
Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                                       | RUN DEPTH                                          | RIFFLE/RUN SUBSTRATE                                                   | RIFFLE/RUN EMBEDDEDNESS                              |
|--------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------|
| <input type="checkbox"/> - Best Areas >10 cm [2]                   | <input type="checkbox"/> - MAX > 50 [2]            | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]          | <input type="checkbox"/> - NONE [2]                  |
| <input type="checkbox"/> - Best Areas 5-10 cm [1]                  | <input checked="" type="checkbox"/> - MAX < 50 [1] | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1]        | <input type="checkbox"/> - LOW [1]                   |
| <input checked="" type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0] |                                                    | <input checked="" type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0] | <input type="checkbox"/> - MODERATE [0]              |
|                                                                    |                                                    |                                                                        | <input checked="" type="checkbox"/> - EXTENSIVE [-1] |
|                                                                    |                                                    | <input type="checkbox"/> - NO RIFFLE [Metric=0]                        |                                                      |

COMMENTS: \_\_\_\_\_

Riffle/Run  
0  
Max 8  
Gradient  
6  
Max 10

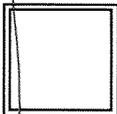
6) GRADIENT (ft/mi): 6.3 DRAINAGE AREA (sq.mi.): 2.3  
%POOL: 10 %GLIDE: 80  
%RIFFLE: 10 %RUN: -

\* Best areas must be large enough to support a population of riffle-obligate species

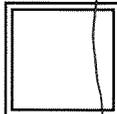
Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

VEGETATED CHANNEL



Subjective Rating (1-10)



Aesthetic Rating (1-10)

Gradient:  - Low,  - Moderate,  - High

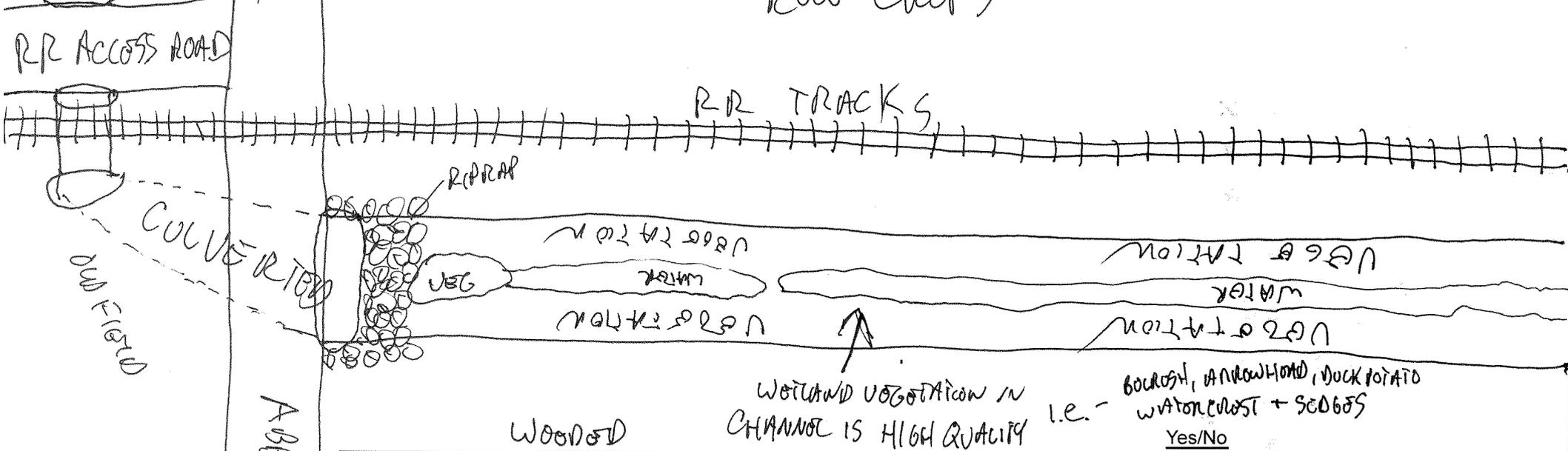
Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|
|               |               |               |                    |                |                |                    |                 |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Walker Ditch 2.2  
Stream Segment Location: At French Creek Road  
QHEI Score: 23.5 HHEI Score: 61

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**FIELD NOTES: 21 AUG 2002**

This section of Walker Ditch is located on the north side of French Creek Road to the west of I-90. The ditch is maintained and of poor quality. It flows via culvert under I-90 and just westward before continuing to the north. The channel is overgrown with cattails and purple loosestrife. The west bank is dominated by a shrub community with green ash saplings, along with silky and gray-stemmed dogwood. The east bank has an old-field community dominated by Canada goldenrod, and teasel. The stream depth was 25 cm and the width was 20'. Industrial development is located on the west side of the ditch approximately 400' from French Creek Road. There is a potential for restoration although the close proximity to I-90 and industrial development may make restoration impractical.

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**PHOTOS:**



1) Walker Ditch 2.2 – Facing downstream from overpass



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 23.5

River Code: RM: 2.2 Stream: WALKER DITCH  
 Date: 8-21-82 Location: AT FRENCH CREEK ROAD  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

|                                                                   |                                                           |                                                    |                                             |                                                      |                                                                                                                                                                           |
|-------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------|---------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TYPE</b>                                                       | <b>POOL RIFFLE</b>                                        | <b>POOL RIFFLE</b>                                 | <b>SUBSTRATE ORIGIN</b>                     | <b>SUBSTRATE QUALITY</b>                             |                                                                                                                                                                           |
| <input type="checkbox"/> -BLDR /SLBS[10] _____                    | <input type="checkbox"/> -GRAVEL [7] _____                | Check ONE (OR 2 & AVERAGE)                         |                                             | Check ONE (OR 2 & AVERAGE)                           | Substrate<br><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">0</div> Max 20 |
| <input type="checkbox"/> -BOULDER [9] _____                       | <input type="checkbox"/> -SAND [6] _____                  | <input type="checkbox"/> -LIMESTONE [1] _____      | SILT:                                       | <input checked="" type="checkbox"/> -SILT HEAVY [-2] |                                                                                                                                                                           |
| <input type="checkbox"/> -COBBLE [8] _____                        | <input type="checkbox"/> -BEDROCK[5] _____                | <input type="checkbox"/> -TILLS [1] _____          |                                             | <input type="checkbox"/> -SILT MODERATE [-1]         |                                                                                                                                                                           |
| <input type="checkbox"/> -HARDPAN [4] _____                       | <input type="checkbox"/> -DETRITUS[3] <u>20</u> <u>70</u> | <input checked="" type="checkbox"/> -WETLANDS[0]   |                                             | <input type="checkbox"/> -SILT NORMAL [0]            |                                                                                                                                                                           |
| <input checked="" type="checkbox"/> -MUCK [2] <u>40</u> <u>40</u> | <input type="checkbox"/> -ARTIFICIAL[0] _____             | <input type="checkbox"/> -HARDPAN [0] _____        |                                             | <input type="checkbox"/> -SILT FREE [1] _____        |                                                                                                                                                                           |
| <input checked="" type="checkbox"/> -SILT [2] <u>40</u> <u>40</u> | NOTE: Ignore Sludge Originating From Point Sources        | <input type="checkbox"/> -SANDSTONE [0] EMBEDDED   |                                             | <input checked="" type="checkbox"/> -EXTENSIVE [-2]  |                                                                                                                                                                           |
| NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >)      |                                                           | <input type="checkbox"/> -4 or More [2]            | <input type="checkbox"/> -RIP/RAP [0] NESS: | <input type="checkbox"/> -MODERATE [-1]              |                                                                                                                                                                           |
|                                                                   |                                                           | <input checked="" type="checkbox"/> -3 or Less [0] | <input type="checkbox"/> -LACUSTRINE [0]    | <input type="checkbox"/> -NORMAL [0]                 |                                                                                                                                                                           |
| COMMENTS                                                          |                                                           | <input type="checkbox"/> -SHALE [-1]               | <input type="checkbox"/> -COAL FINES [-2]   | <input type="checkbox"/> -NONE [1]                   |                                                                                                                                                                           |

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) AMOUNT: (Check ONLY One or check 2 and AVERAGE)

|                                       |                            |                                   |                                                  |                                                                                                                                                                       |
|---------------------------------------|----------------------------|-----------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TYPE: Score All That Occur</b>     |                            |                                   |                                                  | Cover<br><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">5</div> Max 20 |
| <u>0</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <u>0</u> OXBOWS, BACKWATERS [1]   | <input type="checkbox"/> - EXTENSIVE > 75% [11]  |                                                                                                                                                                       |
| <u>1</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <u>2</u> AQUATIC MACROPHYTES [1]  | <input type="checkbox"/> - MODERATE 25-75% [7]   |                                                                                                                                                                       |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>0</u> BOULDERS [1]      | <u>0</u> LOGS OR WOODY DEBRIS [1] | <input type="checkbox"/> - SPARSE 5-25% [3]      |                                                                                                                                                                       |
| <u>0</u> ROOTMATS [1]                 | COMMENTS: _____            |                                   | <input type="checkbox"/> - NEARLY ABSENT < 5%[1] |                                                                                                                                                                       |

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

|                                                |                                                |                                                                 |                                               |                                                                                        |                                                                                                                                                                         |
|------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SINUOSITY</b>                               | <b>DEVELOPMENT</b>                             | <b>CHANNELIZATION</b>                                           | <b>STABILITY</b>                              | <b>MODIFICATIONS/OTHER</b>                                                             | Channel<br><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">4</div> Max 20 |
| <input type="checkbox"/> - HIGH [4]            | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                             | <input type="checkbox"/> - HIGH [3]           | <input type="checkbox"/> - SNAGGING <input type="checkbox"/> - IMPOUND.                |                                                                                                                                                                         |
| <input type="checkbox"/> - MODERATE [3]        | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]                        | <input type="checkbox"/> - MODERATE [2]       | <input checked="" type="checkbox"/> - RELOCATION <input type="checkbox"/> - ISLANDS    |                                                                                                                                                                         |
| <input type="checkbox"/> - LOW [2]             | <input type="checkbox"/> - FAIR [3]            | <input type="checkbox"/> - RECOVERING [3]                       | <input checked="" type="checkbox"/> - LOW [1] | <input type="checkbox"/> - CANOPY REMOVAL <input type="checkbox"/> - LEVEED            |                                                                                                                                                                         |
| <input checked="" type="checkbox"/> - NONE [1] | <input checked="" type="checkbox"/> - POOR [1] | <input checked="" type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                               | <input type="checkbox"/> - DREDGING <input checked="" type="checkbox"/> - BANK SHAPING |                                                                                                                                                                         |
|                                                |                                                |                                                                 |                                               | <input type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS                              |                                                                                                                                                                         |

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

|                                                           |                                                              |                                                               |                                                                                                                                                                            |
|-----------------------------------------------------------|--------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>RIPARIAN WIDTH</b>                                     | <b>FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)</b>         | <b>BANK EROSION</b>                                           | Riparian<br><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">7.5</div> Max 10 |
| L R (Per Bank)                                            | L R (Most Predominant Per Bank)                              | L R                                                           | L R (Per Bank)                                                                                                                                                             |
| <input checked="" type="checkbox"/> - WIDE > 50m [4]      | <input type="checkbox"/> - FOREST, SWAMP [3]                 | <input type="checkbox"/> - CONSERVATION TILLAGE [1]           | <input checked="" type="checkbox"/> - NONE/LITTLE [3]                                                                                                                      |
| <input type="checkbox"/> - MODERATE 10-50m [3]            | <input checked="" type="checkbox"/> - SHRUB OR OLD FIELD [2] | <input checked="" type="checkbox"/> - URBAN OR INDUSTRIAL [0] | <input type="checkbox"/> - MODERATE [2]                                                                                                                                    |
| <input type="checkbox"/> - NARROW 5-10 m [2]              | <input type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1]  | <input type="checkbox"/> - OPEN PASTURE, ROWCROP [0]          | <input type="checkbox"/> - HEAVY/SEVERE [1]                                                                                                                                |
| <input checked="" type="checkbox"/> - VERY NARROW <5 m[1] | <input type="checkbox"/> - FENCED PASTURE [1]                | <input type="checkbox"/> - MINING/CONSTRUCTION [0]            |                                                                                                                                                                            |
| <input type="checkbox"/> - NONE [0]                       |                                                              |                                                               |                                                                                                                                                                            |

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

|                                                     |                                                                     |                                                                                                |                                                                                                                                                                                  |
|-----------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MAX. DEPTH</b><br>(Check 1 ONLY!)                | <b>MORPHOLOGY</b><br>(Check 1 or 2 & AVERAGE)                       | <b>CURRENT VELOCITY ( POOLS &amp; RIFFLES! )</b><br>(Check All That Apply)                     | Pool/<br>Current<br><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">1</div> Max 12 |
| <input type="checkbox"/> - >1m [6]                  | <input type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2]            | <input type="checkbox"/> - EDDIES[1] <input type="checkbox"/> - TORRENTIAL[-1]                 |                                                                                                                                                                                  |
| <input type="checkbox"/> - 0.7-1m [4]               | <input checked="" type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> - FAST[1] <input type="checkbox"/> - INTERSTITIAL[-1]                 |                                                                                                                                                                                  |
| <input type="checkbox"/> - 0.4-0.7m [2]             | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> - MODERATE [1] <input checked="" type="checkbox"/> - INTERMITTENT[-2] |                                                                                                                                                                                  |
| <input checked="" type="checkbox"/> - 0.2- 0.4m [1] |                                                                     | <input checked="" type="checkbox"/> - SLOW [1] <input type="checkbox"/> - VERY FAST[1]         |                                                                                                                                                                                  |
| <input type="checkbox"/> - < 0.2m [POOL=0]          | COMMENTS: _____                                                     |                                                                                                |                                                                                                                                                                                  |

CHECK ONE OR CHECK 2 AND AVERAGE

|                                                         |                                         |                                                                 |                                           |                                                                                                                                                                           |
|---------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>RIFFLE DEPTH</b>                                     | <b>RUN DEPTH</b>                        | <b>RIFFLE/RUN SUBSTRATE</b>                                     | <b>RIFFLE/RUN EMBEDDEDNESS</b>            | Riffle/Run<br><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">0</div> Max 8 |
| <input type="checkbox"/> - Best Areas >10 cm [2]        | <input type="checkbox"/> - MAX > 50 [2] | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> - NONE [2]       |                                                                                                                                                                           |
| <input type="checkbox"/> - Best Areas 5-10 cm[1]        | <input type="checkbox"/> - MAX < 50[1]  | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> - LOW [1]        |                                                                                                                                                                           |
| <input type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0] |                                         | <input type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> - MODERATE [0]   |                                                                                                                                                                           |
| COMMENTS: _____                                         |                                         | <input checked="" type="checkbox"/> - NO RIFFLE [Metric=0]      | <input type="checkbox"/> - EXTENSIVE [-1] | Gradient<br><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">6</div> Max 10  |

6] GRADIENT (ft/mi): 8.3 DRAINAGE AREA (sq.mi.): 0.7

|                                |                                            |
|--------------------------------|--------------------------------------------|
| % POOL: <input type="text"/>   | % GLIDE: <input type="text" value="100%"/> |
| % RIFFLE: <input type="text"/> | % RUN: <input type="text"/>                |

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Major Suspected Sources of Impacts (Check All That Apply):

- None
- Industrial
- WWTP
- Ag
- Livestock
- Silviculture
- Construction
- Urban Runoff
- CSOs
- Suburban Impacts
- Mining
- Channelization
- Riparian Removal
- Landfills
- Natural Dams
- Other Flow Alteration
- Other: \_\_\_\_\_

INDUSTRIAL FACILITY AND ACCESS

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:

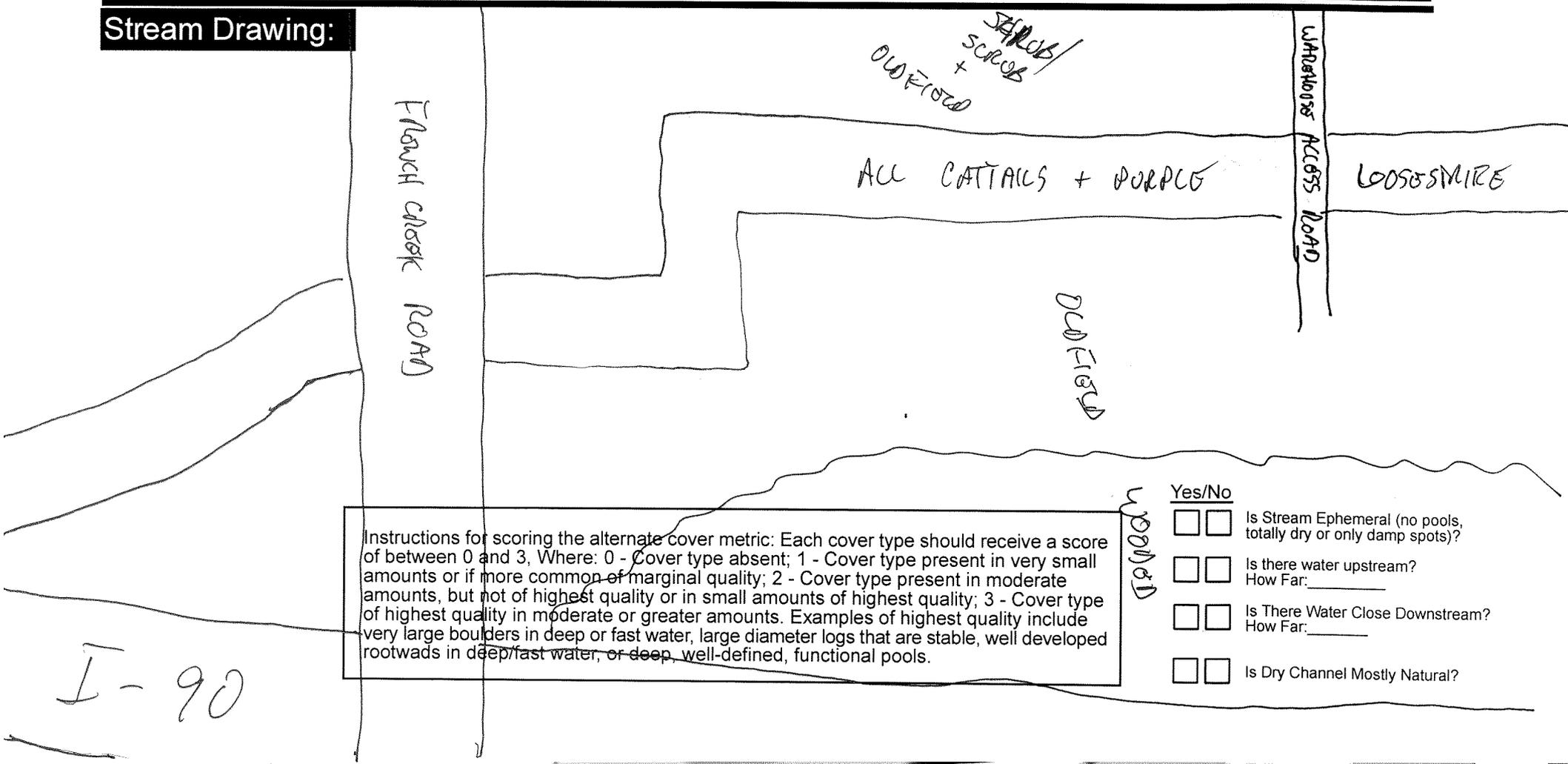
- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

| Stream Measurements: |               |               |                        |                     |           |                    |                 |                    |  |
|----------------------|---------------|---------------|------------------------|---------------------|-----------|--------------------|-----------------|--------------------|--|
| Average Width        | Average Depth | Maximum Depth | Average Bankfull Width | Bankfull Mean Depth | W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrenchment Ratio |  |
|                      |               |               |                        |                     |           |                    |                 |                    |  |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

Yes/No

- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
- Is there water upstream? How Far: \_\_\_\_\_
- Is There Water Close Downstream? How Far: \_\_\_\_\_
- Is Dry Channel Mostly Natural?

I-90



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

61

SITE NAME/LOCATION WALKER DITCH AT EDENCHA CREEK ROAD  
 SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 0.7  
 LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 2.2  
 DATE 8-21-02 SCORER JAY MILLER COMMENTS MAINTAINED DITCH

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY  
 MODIFICATIONS:

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                 | PERCENT | TYPE                                                   | PERCENT   |
|------------------------------------------------------|---------|--------------------------------------------------------|-----------|
| <input type="checkbox"/> BLDR SLABS [16 pts]         | _____   | <input checked="" type="checkbox"/> SILT [3 pt]        | <u>40</u> |
| <input type="checkbox"/> BOULDER (>256 mm) [16 pts]  | _____   | <input type="checkbox"/> LEAF PACKWOODY DEBRIS [3 pts] | _____     |
| <input type="checkbox"/> BEDROCK [16 pt]             | _____   | <input type="checkbox"/> FINE DETRITUS [3 pts]         | <u>20</u> |
| <input type="checkbox"/> COBBLE (65-256 mm) [12 pts] | _____   | <input type="checkbox"/> CLAY or HARDPAN [0 pt]        | _____     |
| <input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]    | _____   | <input type="checkbox"/> MUCK [0 pts]                  | <u>40</u> |
| <input type="checkbox"/> SAND (<2 mm) [6 pts]        | _____   | <input type="checkbox"/> ARTIFICIAL [3 pts]            | _____     |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 0 (A) 3 (B) 3

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points

Substrate Max = 40

6

A + B

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                             |                                                            |
|-------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts]          | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input checked="" type="checkbox"/> > 22.5 - 30 cm [30 pts] | <input type="checkbox"/> < 5 cm [5 pts]                    |
| <input type="checkbox"/> > 10 - 22.5 cm [25 pts]            | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

Pool Depth Max = 30

30

COMMENTS \_\_\_\_\_ MAXIMUM POOL DEPTH (centimeters): 25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                              |                                                                     |
|------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                       | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input checked="" type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts] | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]          |                                                                     |

Bankfull Width Max=30

25

COMMENTS 3.6, 3.3, 3.9 AVERAGE BANKFULL WIDTH (meters) 3.6

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                                                          |                | FLOODPLAIN QUALITY                                                      |                                     |
|-------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------|-------------------------------------|
| L R                                                                     | (Per Bank)     | L R                                                                     | (Most Predominant per Bank)         |
| <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> | Wide >10m      | <input type="checkbox"/> <input type="checkbox"/>                       | Mature Forest, Wetland              |
| <input type="checkbox"/> <input type="checkbox"/>                       | Moderate 5-10m | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> | Immature Forest, Shrub or Old Field |
| <input type="checkbox"/> <input checked="" type="checkbox"/>            | Narrow <5m     | <input type="checkbox"/> <input type="checkbox"/>                       | Residential, Park, New Field        |
| <input type="checkbox"/> <input type="checkbox"/>                       | None           | <input type="checkbox"/> <input type="checkbox"/>                       | Fenced Pasture                      |
|                                                                         |                | <input type="checkbox"/> <input type="checkbox"/>                       | Conservation Tillage                |
|                                                                         |                | <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> | Urban or Industrial                 |
|                                                                         |                | <input type="checkbox"/> <input type="checkbox"/>                       | Open Pasture, Row Crop              |
|                                                                         |                | <input type="checkbox"/> <input type="checkbox"/>                       | Mining or Construction              |

COMMENTS \_\_\_\_\_

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):  
 Stream Flowing  Moist Channel, isolated pools, no flow (Intermittent)  
 Subsurface flow with isolated pools (Interstitial)  Dry channel, no water (Ephemeral)  
 COMMENTS \_\_\_\_\_

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):  
 None  1.0  2.0  3.0  
 0.5  1.5  2.5  >3

STREAM GRADIENT ESTIMATE  
 Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score 23.5 (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

WWH Name: FRENCH CREEK Distance from Evaluated Stream 2.2 MILES  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH NRCS Soil Map Page: 7 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LORAIN Township / City: SHEFFIELD

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: 19 AUG 02 Quantity: \_\_\_\_\_

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): Y Canopy (% open): 100

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_

Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: RUNOFF FROM I-90, INDUSTRIAL DEVELOPMENT IN AREA

**BIOTIC EVALUATION**

Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_

Comments Regarding Biology: STRAIGHT, SLOW TO STAGNANT FLOWING VEGETATED DITCH

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location

FLOW → SEE QHEI SHEET

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Walker Ditch 3.3

Stream Segment Location: At Reserve Way

QHEI Score: 31.5

HHEI Score: 52

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**FIELD NOTES:**

This portion of Walker Ditch is located in a residential subdivision (Reserve Way). A shrub/forested buffer 10-15' wide separates the ditch from the adjoining residential lawns. Dominant species in the buffer include: staghorn sumac, gray-stemmed dogwood, swamp white oak, boxelder, and riverbank grape. The channel is mostly un-vegetated, although spotted touch-me-not, cattails and rice cutgrass were noted. The substrate is mostly hardpan with some silt. Water depth was generally 5-10 cm deep with slow flow. No restoration opportunities were noted.

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**PHOTOS:**



1) Walker Ditch 3.3 – Facing North from Reserve Way



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 31.5

River Code: RM: 3.3 Stream: WALKER DITCH

Date: 8-27-02 Location: AT RESERVE WAY

Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

| TYPE                                                                 | POOL RIFFLE                                              | POOL RIFFLE                                    | SUBSTRATE ORIGIN                                 | SUBSTRATE QUALITY                                     |
|----------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------|--------------------------------------------------|-------------------------------------------------------|
| <input type="checkbox"/> -BLDR /SLBS[10] _____                       | <input type="checkbox"/> -GRAVEL [7] <u>20</u> <u>20</u> | Check ONE (OR 2 & AVERAGE)                     |                                                  | Check ONE (OR 2 & AVERAGE)                            |
| <input type="checkbox"/> -BOULDER [9] _____                          | <input type="checkbox"/> -SAND [6] _____                 | <input type="checkbox"/> -LIMESTONE [1] _____  | SILT:                                            | <input checked="" type="checkbox"/> - SILT HEAVY [-2] |
| <input type="checkbox"/> -COBBLE [8] <u>5</u> <u>5</u>               | <input type="checkbox"/> -BEDROCK[5] _____               | <input checked="" type="checkbox"/> -TILLS [1] | <input type="checkbox"/> -WETLANDS[0]            | <input type="checkbox"/> -SILT MODERATE [-1]          |
| <input checked="" type="checkbox"/> -HARDPAN [4] <u>30</u> <u>30</u> | <input type="checkbox"/> -DETRITUS[3] _____              | <input type="checkbox"/> -HARDPAN [0]          | <input type="checkbox"/> -SANDSTONE [0] EMBEDDED | <input type="checkbox"/> -SILT NORMAL [0]             |
| <input type="checkbox"/> -MUCK [2] _____                             | <input type="checkbox"/> -ARTIFICIAL[0] _____            | <input type="checkbox"/> -RIP/RAP [0] _____    | NESS:                                            | <input type="checkbox"/> -SILT FREE [1]               |
| <input checked="" type="checkbox"/> -SILT [2] <u>45</u> <u>45</u>    | NOTE: Ignore Sludge Originating From Point Sources       | <input type="checkbox"/> -LACUSTRINE [0]       | <input type="checkbox"/> -SHALE [-1]             | <input checked="" type="checkbox"/> -EXTENSIVE [-2]   |
|                                                                      |                                                          |                                                |                                                  | <input type="checkbox"/> -MODERATE [-1]               |
|                                                                      |                                                          |                                                |                                                  | <input type="checkbox"/> -NONE [1]                    |
|                                                                      |                                                          |                                                |                                                  | <input type="checkbox"/> -COAL FINES [-2]             |

Substrate  
2.5  
Max 20

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
(High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS: \_\_\_\_\_

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)  
(Structure) TYPE: Score All That Occur

|                                       |                           |                                   |
|---------------------------------------|---------------------------|-----------------------------------|
| <u>0</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS> 70 cm [2] | <u>0</u> OXBOWS, BACKWATERS [1]   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]     | <u>2</u> AQUATIC MACROPHYTES [1]  |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>0</u> BOULDERS [1]     | <u>1</u> LOGS OR WOODY DEBRIS [1] |
| <u>0</u> ROOTMATS [1]                 | COMMENTS: _____           |                                   |

AMOUNT: (Check ONLY One or check 2 and AVERAGE)

|                                                  |
|--------------------------------------------------|
| <input type="checkbox"/> - EXTENSIVE > 75% [11]  |
| <input type="checkbox"/> - MODERATE 25-75% [7]   |
| <input type="checkbox"/> - SPARSE 5-25% [3]      |
| <input type="checkbox"/> - NEARLY ABSENT < 5%[1] |

Cover  
7  
Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                     | DEVELOPMENT                                    | CHANNELIZATION                                       | STABILITY                                     | MODIFICATIONS/OTHER                                       |
|-----------------------------------------------|------------------------------------------------|------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|
| <input type="checkbox"/> - HIGH [4]           | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                  | <input type="checkbox"/> - HIGH [3]           | <input type="checkbox"/> - SNAGGING                       |
| <input type="checkbox"/> - MODERATE [3]       | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]             | <input type="checkbox"/> - MODERATE [2]       | <input checked="" type="checkbox"/> - RELOCATION          |
| <input checked="" type="checkbox"/> - LOW [2] | <input type="checkbox"/> - FAIR [3]            | <input checked="" type="checkbox"/> - RECOVERING [3] | <input checked="" type="checkbox"/> - LOW [1] | <input type="checkbox"/> - CANOPY REMOVAL                 |
| <input type="checkbox"/> - NONE [1]           | <input checked="" type="checkbox"/> - POOR [1] | <input type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                               | <input type="checkbox"/> - DREDGING                       |
|                                               |                                                |                                                      |                                               | <input type="checkbox"/> - BANK SHAPING                   |
|                                               |                                                |                                                      |                                               | <input type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS |

Channel  
7  
Max 20

COMMENTS: \_\_\_\_\_

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

| RIPARIAN WIDTH                                             |                                                                        | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)        |                                                    | BANK EROSION                                       |                                                                                                |
|------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------|
| L R (Per Bank)                                             | L R (Most Predominant Per Bank)                                        | L R                                                  | L R                                                | L R (Per Bank)                                     | Riparian                                                                                       |
| <input type="checkbox"/> - WIDE > 50m [4]                  | <input type="checkbox"/> - FOREST, SWAMP [3]                           | <input type="checkbox"/> - CONSERVATION TILLAGE [1]  | <input type="checkbox"/> - URBAN OR INDUSTRIAL [0] | <input type="checkbox"/> - NONE/LITTLE [3]         | <span style="border: 1px solid black; padding: 5px; display: inline-block;">4</span><br>Max 10 |
| <input type="checkbox"/> - MODERATE 10-50m [3]             | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]                      | <input type="checkbox"/> - OPEN PASTURE, ROWCROP [0] | <input type="checkbox"/> - MINING/CONSTRUCTION [0] | <input checked="" type="checkbox"/> - MODERATE [2] |                                                                                                |
| <input type="checkbox"/> - NARROW 5-10 m [2]               | <input checked="" type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] |                                                      |                                                    | <input type="checkbox"/> - HEAVY/SEVERE [1]        |                                                                                                |
| <input checked="" type="checkbox"/> - VERY NARROW <5 m [1] | <input type="checkbox"/> - FENCED PASTURE [1]                          |                                                      |                                                    |                                                    |                                                                                                |
| <input type="checkbox"/> - NONE [0]                        |                                                                        |                                                      |                                                    |                                                    |                                                                                                |

COMMENTS: \_\_\_\_\_

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH                                            | MORPHOLOGY                                                       | CURRENT VELOCITY [ POOLS & RIFFLES! ]          |
|-------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------|
| (Check 1 ONLY!)                                       | (Check 1 or 2 & AVERAGE)                                         | (Check All That Apply)                         |
| <input type="checkbox"/> - >1m [6]                    | <input type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2]         | <input type="checkbox"/> - EDDIES[1]           |
| <input type="checkbox"/> - 0.7-1m [4]                 | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1]         | <input type="checkbox"/> - FAST[1]             |
| <input type="checkbox"/> - 0.4-0.7m [2]               | <input checked="" type="checkbox"/> - POOL WIDTH < RIFFLE W. [0] | <input type="checkbox"/> - MODERATE [1]        |
| <input type="checkbox"/> - 0.2- 0.4m [1]              |                                                                  | <input checked="" type="checkbox"/> - SLOW [1] |
| <input checked="" type="checkbox"/> - < 0.2m [POOL=0] | COMMENTS: _____                                                  | <input type="checkbox"/> - TORRENTIAL[-1]      |
|                                                       |                                                                  | <input type="checkbox"/> - INTERSTITIAL[-1]    |
|                                                       |                                                                  | <input type="checkbox"/> - INTERMITTENT[-2]    |
|                                                       |                                                                  | <input type="checkbox"/> - VERY FAST[1]        |

Pool/  
Current  
1  
Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                                       | RUN DEPTH                                          | RIFFLE/RUN SUBSTRATE                                                   | RIFFLE/RUN EMBEDDEDNESS                              |
|--------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------|
| <input type="checkbox"/> - Best Areas >10 cm [2]                   | <input type="checkbox"/> - MAX > 50 [2]            | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]          | <input type="checkbox"/> - NONE [2]                  |
| <input type="checkbox"/> - Best Areas 5-10 cm [1]                  | <input checked="" type="checkbox"/> - MAX < 50 [1] | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1]        | <input type="checkbox"/> - LOW [1]                   |
| <input checked="" type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0] |                                                    | <input checked="" type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0] | <input type="checkbox"/> - MODERATE [0]              |
|                                                                    |                                                    |                                                                        | <input checked="" type="checkbox"/> - EXTENSIVE [-1] |
|                                                                    |                                                    | <input type="checkbox"/> - NO RIFFLE [Metric=0]                        |                                                      |

COMMENTS: \_\_\_\_\_

Riffle/Run  
0  
Max 8  
Gradient  
10  
Max 10

6] GRADIENT (ft/mi): 17.4 DRAINAGE AREA (sq. mi.): 0.2  
%POOL: 30 %GLIDE: 40  
%RIFFLE: 20 %RUN: 10

\*\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N)\_\_\_ If Not, Explain:

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- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)       Aesthetic Rating (1-10)

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|
|               |               |               |                    |                |                |                    |                 |                 |

- Low,  - Moderate,  -High      Gradient: \_\_\_\_\_

**Stream Drawing:**

SEE THE FORM

Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3):

52

SITE NAME/LOCATION WALKER DITCH AT RESERVE WAY  
 SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 0.2  
 LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 3.3  
 DATE 8-22-02 SCORER JAY MILLER COMMENTS \_\_\_\_\_

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY  
 MODIFICATIONS:

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                 | PERCENT | TYPE                                                    | PERCENT |
|------------------------------------------------------|---------|---------------------------------------------------------|---------|
| <input type="checkbox"/> BLDR SLABS [16 pts]         | _____   | <input checked="" type="checkbox"/> SILT [3 pt]         | 45      |
| <input type="checkbox"/> BOULDER (>256 mm) [16 pts]  | _____   | <input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts] | _____   |
| <input type="checkbox"/> BEDROCK [16 pt]             | _____   | <input type="checkbox"/> FINE DETRITUS [3 pts]          | _____   |
| <input type="checkbox"/> COBBLE (65-256 mm) [12 pts] | 5       | <input type="checkbox"/> CLAY or HARDPAN [0 pt]         | 30      |
| <input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]    | 20      | <input type="checkbox"/> MUCK [0 pts]                   | _____   |
| <input type="checkbox"/> SAND (<2 mm) [6 pts]        | _____   | <input type="checkbox"/> ARTIFICIAL [3 pts]             | _____   |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 5 (A) 3 (B) 4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points

Substrate Max = 40

7

A + B

Pool Depth Max = 30

25

Bankfull Width Max=30

20

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                             |                                                            |
|-------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts]          | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]            | <input type="checkbox"/> < 5 cm [5 pts]                    |
| <input checked="" type="checkbox"/> > 10 - 22.5 cm [25 pts] | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS VERY NARROW, SLOW MOVING CHANNEL MAXIMUM POOL DEPTH (centimeters): 12cm

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                                |                                                                     |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                         | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]              | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts] |                                                                     |

COMMENTS \_\_\_\_\_ AVERAGE BANKFULL WIDTH (meters) 2.3

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                      |                                     | FLOODPLAIN QUALITY                  |                                     |                          |                          |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| L                                   | R                                   | L                                   | R                                   | L                        | R                        |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| (Per Bank)                          |                                     | (Most Predominant per Bank)         |                                     | Conservation Tillage     |                          |
| Wide >10m                           |                                     | Mature Forest, Wetland              |                                     | <input type="checkbox"/> | Urban or Industrial      |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Open Pasture, Row Crop   |
| Moderate 5-10m                      |                                     | Immature Forest, Shrub or Old Field |                                     | <input type="checkbox"/> | Mining or Construction   |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |                          |                          |
| Narrow <5m                          |                                     | Residential, Park, New Field        |                                     |                          |                          |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |                          |
| None                                |                                     | Fenced Pasture                      |                                     |                          |                          |

COMMENTS \_\_\_\_\_

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):  
 Stream Flowing  Moist Channel, isolated pools, no flow (Intermittent)  
 Subsurface flow with isolated pools (Interstitial)  Dry channel, no water (Ephemeral)  
 COMMENTS \_\_\_\_\_

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):  
 None  1.0  2.0  3.0  
 0.5  1.5  2.5  >3

STREAM GRADIENT ESTIMATE

Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score 31.5 (If Yes, Attach Completed QHEI Form)

DOWNSIDE DESIGNATED USE(S)  
 WWH Name: FRENCH CREEK Distance from Evaluated Stream 3.3 MILES  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH NRCS Soil Map Page: 12 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LORAIN Township / City: SHEFFIELD

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: 8/19 Quantity: \_\_\_\_\_

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): N Canopy (% open): 25%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_

Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_

Is the sampling reach representative of the stream (Y/N) \_\_\_\_\_ If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: COLLECTED UNDER ROAD, RUNS THROUGH NEW RESIDENTIAL DEVELOPMENT

**BIOTIC EVALUATION**

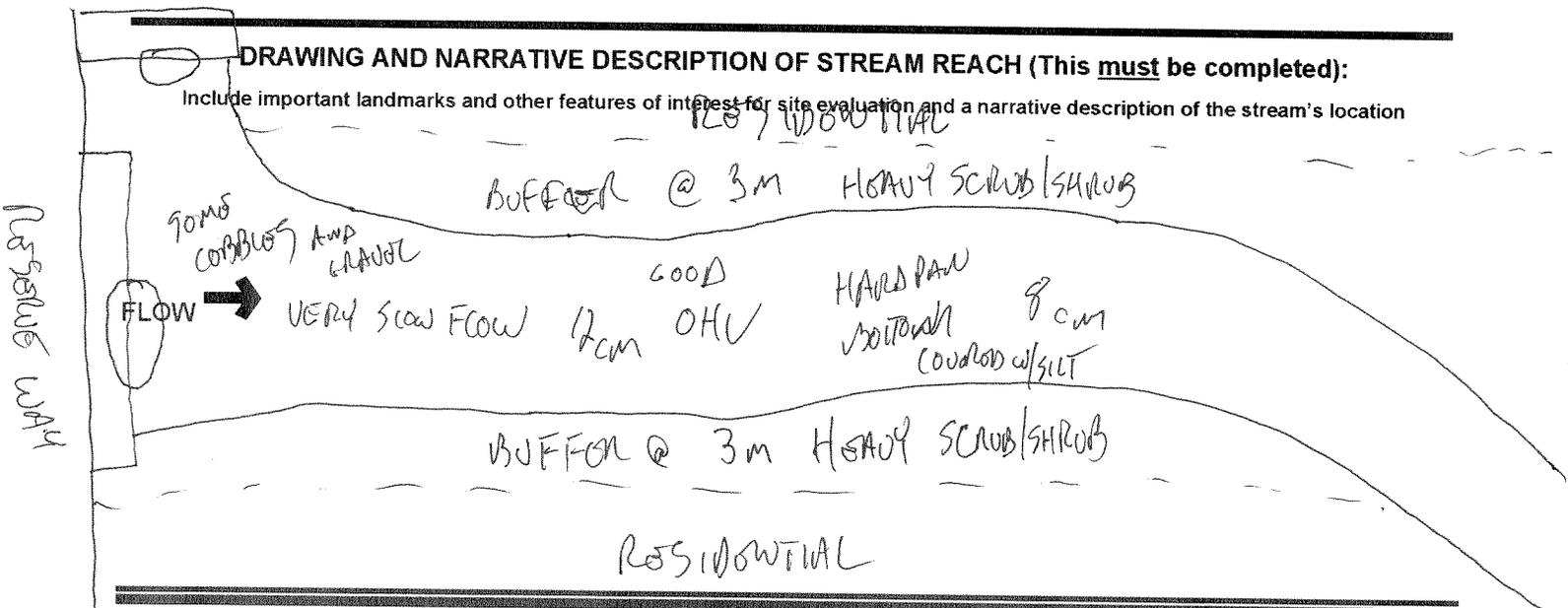
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_

Comments Regarding Biology: SOME FROGS NOTED ALONG BANKS

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Walker Ditch 3.45  
Stream Segment Location: End – at Reserve Way by Pond  
QHEI Score: 29.5 HHEI Score: 73

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FIELD NOTES: 22 AUG 2002

This site is located on the west side of Reserve Way, a residential subdivision. It encompasses the headwaters of Walker Ditch. The creek is 10' wide, 25 cm. deep with very little flow. A tree line (American elm, green ash, crab apple, black cherry) buffers the north bank (20' wide) from the maintained lawns. The south bank is maintained lawn between the ditch and an adjacent retention pond. The sediment is dominated by silt and sand with obvious signs of pollution (oily film). Portions of the channel contain cattails. The ditch appears to be intermittently maintained. Input from storm sewers and outflow from the pond provide hydrological inputs. The ditch has been piped to the west. No opportunities for restoration were noted.

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PHOTOS:



1) Walker Ditch 3.45 – Retention Pond and Walker Ditch west



2) Walker Ditch 3.45 – Retention Pond and Walker Ditch west



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **29.5**

River Code: RM: 3.45 Stream: WALKER DITCH  
 Date: 8-22-03 Location: AT END - RESERVE WAY  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

|                                                                   |                                                                   |                                                      |                                             |                                                       |
|-------------------------------------------------------------------|-------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------|-------------------------------------------------------|
| TYPE                                                              | POOL RIFFLE                                                       | POOL RIFFLE                                          | SUBSTRATE ORIGIN                            | SUBSTRATE QUALITY                                     |
| <input type="checkbox"/> -BLDR /SLBS[10] _____                    | <input type="checkbox"/> -GRAVEL [7] <u>20</u> <u>20</u>          | Check ONE (OR 2 & AVERAGE)                           |                                             | Check ONE (OR 2 & AVERAGE)                            |
| <input type="checkbox"/> -BOULDER [9] _____                       | <input checked="" type="checkbox"/> -SAND [6] <u>30</u> <u>30</u> | <input type="checkbox"/> -LIMESTONE [1] _____        | SILT:                                       | <input checked="" type="checkbox"/> - SILT HEAVY [-2] |
| <input type="checkbox"/> -COBBLE [8] <u>10</u> <u>10</u>          | <input type="checkbox"/> -BEDROCK[5] _____                        | <input checked="" type="checkbox"/> -TILLS [1] _____ | <input type="checkbox"/> -WETLANDS[0] _____ | <input type="checkbox"/> -SILT MODERATE [-1]          |
| <input type="checkbox"/> -HARDPAN [4] _____                       | <input type="checkbox"/> -DETRITUS[3] _____                       | <input type="checkbox"/> -WETLANDS[0] _____          | <input type="checkbox"/> -HARDPAN [0] _____ | <input type="checkbox"/> -SILT NORMAL [0]             |
| <input type="checkbox"/> -MUCK [2] _____                          | <input type="checkbox"/> -ARTIFICIAL[0] _____                     | <input type="checkbox"/> -SANDSTONE [0] EMBEDDED     | <input type="checkbox"/> -RIP/RAP [0] _____ | <input type="checkbox"/> -SILT FREE [1] _____         |
| <input checked="" type="checkbox"/> -SILT [2] <u>40</u> <u>40</u> | NOTE: Ignore Sludge Originating From Point Sources                | <input type="checkbox"/> -LACUSTRINE [0] _____       | <input type="checkbox"/> -SHALE [-1] _____  | <input checked="" type="checkbox"/> -EXTENSIVE [-2]   |
|                                                                   |                                                                   | <input type="checkbox"/> -COAL FINES [-2] _____      |                                             | <input type="checkbox"/> -MODERATE [-1]               |
|                                                                   |                                                                   |                                                      |                                             | <input type="checkbox"/> -NORMAL [0]                  |
|                                                                   |                                                                   |                                                      |                                             | <input type="checkbox"/> -NONE [1]                    |

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  3 or Less [0]

COMMENTS: \_\_\_\_\_

Substrate  
5  
 Max 20

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

|                                       |                            |                                                  |
|---------------------------------------|----------------------------|--------------------------------------------------|
| (Structure)                           | TYPE: Score All That Occur | AMOUNT: (Check ONLY One or check 2 and AVERAGE)  |
| <u>0</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <input type="checkbox"/> - EXTENSIVE > 75% [11]  |
| <u>1</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <input type="checkbox"/> - MODERATE 25-75% [7]   |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>0</u> BOULDERS [1]      | <input type="checkbox"/> - SPARSE 5-25% [3]      |
| <u>0</u> ROOTMATS [1]                 | COMMENTS: _____            | <input type="checkbox"/> - NEARLY ABSENT < 5%[1] |

Cover  
5  
 Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

|                                                |                                                |                                                                 |                                               |                                                           |
|------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------|
| SINUOSITY                                      | DEVELOPMENT                                    | CHANNELIZATION                                                  | STABILITY                                     | MODIFICATIONS/OTHER                                       |
| <input type="checkbox"/> - HIGH [4]            | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                             | <input type="checkbox"/> - HIGH [3]           | <input type="checkbox"/> - SNAGGING                       |
| <input type="checkbox"/> - MODERATE [3]        | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]                        | <input type="checkbox"/> - MODERATE [2]       | <input type="checkbox"/> - IMPOUND.                       |
| <input type="checkbox"/> - LOW [2]             | <input type="checkbox"/> - FAIR [3]            | <input type="checkbox"/> - RECOVERING [3]                       | <input checked="" type="checkbox"/> - LOW [1] | <input checked="" type="checkbox"/> - RELOCATION          |
| <input checked="" type="checkbox"/> - NONE [1] | <input checked="" type="checkbox"/> - POOR [1] | <input checked="" type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                               | <input checked="" type="checkbox"/> - CANOPY REMOVAL      |
|                                                |                                                |                                                                 |                                               | <input type="checkbox"/> - LEVEED                         |
|                                                |                                                |                                                                 |                                               | <input checked="" type="checkbox"/> - DREDGING            |
|                                                |                                                |                                                                 |                                               | <input checked="" type="checkbox"/> - BANK SHAPING        |
|                                                |                                                |                                                                 |                                               | <input type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS |

Channel  
4  
 Max 20

4.] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

|                                                             |                                                                        |                                                    |
|-------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------|
| RIPARIAN WIDTH                                              | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)                          | BANK EROSION                                       |
| L R (Per Bank)                                              | L R (Most Predominant Per Bank)                                        | L R (Per Bank)                                     |
| <input type="checkbox"/> - WIDE > 50m [4]                   | <input type="checkbox"/> - FOREST, SWAMP [3]                           | <input type="checkbox"/> - NONE/LITTLE [3]         |
| <input type="checkbox"/> - MODERATE 10-50m [3]              | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]                      | <input checked="" type="checkbox"/> - MODERATE [2] |
| <input type="checkbox"/> - NARROW 5-10 m [2]                | <input checked="" type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> - HEAVY/SEVERE [1]        |
| <input checked="" type="checkbox"/> - VERY NARROW < 5 m [1] | <input type="checkbox"/> - FENCED PASTURE [1]                          |                                                    |
| <input checked="" type="checkbox"/> - NONE [0]              |                                                                        |                                                    |

COMMENTS: \_\_\_\_\_

Riparian  
3 1/2  
 Max 10

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

|                                                     |                                                                  |                                                |
|-----------------------------------------------------|------------------------------------------------------------------|------------------------------------------------|
| MAX. DEPTH (Check 1 ONLY!)                          | MORPHOLOGY (Check 1 or 2 & AVERAGE)                              | CURRENT VELOCITY (Check All That Apply)        |
| <input type="checkbox"/> - >1m [6]                  | <input type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2]         | <input type="checkbox"/> - EDDIES[1]           |
| <input type="checkbox"/> - 0.7-1m [4]               | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1]         | <input type="checkbox"/> - TORRENTIAL[-1]      |
| <input type="checkbox"/> - 0.4-0.7m [2]             | <input checked="" type="checkbox"/> - POOL WIDTH < RIFFLE W. [0] | <input type="checkbox"/> - INTERSTITIAL[-1]    |
| <input checked="" type="checkbox"/> - 0.2- 0.4m [1] |                                                                  | <input type="checkbox"/> - INTERMITTENT[-2]    |
| <input type="checkbox"/> - < 0.2m [POOL=0]          | COMMENTS: _____                                                  | <input checked="" type="checkbox"/> - SLOW [1] |
|                                                     |                                                                  | <input type="checkbox"/> - VERY FAST[1]        |

Pool/Current  
2  
 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

|                                                         |                                         |                                                                 |                                           |
|---------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|-------------------------------------------|
| RIFFLE DEPTH                                            | RUN DEPTH                               | RIFFLE/RUN SUBSTRATE                                            | RIFFLE/RUN EMBEDDEDNESS                   |
| <input type="checkbox"/> - Best Areas >10 cm [2]        | <input type="checkbox"/> - MAX > 50 [2] | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> - NONE [2]       |
| <input type="checkbox"/> - Best Areas 5-10 cm [1]       | <input type="checkbox"/> - MAX < 50 [1] | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> - LOW [1]        |
| <input type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0] |                                         | <input type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> - MODERATE [0]   |
| COMMENTS: _____                                         |                                         | <input checked="" type="checkbox"/> - NO RIFFLE [Metric=0]      | <input type="checkbox"/> - EXTENSIVE [-1] |

Riffle/Run  
0  
 Max 8  
 Gradient  
10  
 Max 10

6] GRADIENT (ft/mi): 17.4 DRAINAGE AREA (sq. mi.): 0.1

%POOL: - %GLIDE: 100  
 %RIFFLE: - %RUN: -

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

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- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                     |       |           |                |              |                |
|---------------------|-------|-----------|----------------|--------------|----------------|
|                     | Gear: | Distance: | Water Clarity: | Water Stage: | Canopy -% Open |
| First Sampling Pass | _____ | _____     | _____          | _____        | _____          |

| Stream Measurements: |               |               |                    |                |                |                    |                 |       |                 |
|----------------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-------|-----------------|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Width | Entrench. Ratio |
|                      |               |               |                    |                |                |                    |                 |       |                 |

Subjective Rating (1-10)  - Low,  - Moderate,  - High

Aesthetic Rating (1-10)  - Low,  - Moderate,  - High

Gradient: \_\_\_\_\_

**Stream Drawing:**

*SEE HHOT FORM*

Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

73

SITE NAME/LOCATION WALKER DITCH AT END - RESERVE WAY  
 SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 0.1  
 LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 3.45  
 DATE 8-22-02 SCORER JAY MILLER COMMENTS \_\_\_\_\_

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY  
 MODIFICATIONS:

1. **SUBSTRATE** (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                     | PERCENT   | TYPE                                                   | PERCENT   |
|----------------------------------------------------------|-----------|--------------------------------------------------------|-----------|
| <input type="checkbox"/> BLDR SLABS [16 pts]             | _____     | <input checked="" type="checkbox"/> SILT [3 pt]        | <u>40</u> |
| <input type="checkbox"/> BOULDER (>256 mm) [16 pts]      | _____     | <input type="checkbox"/> LEAF PACKWOODY DEBRIS [3 pts] | _____     |
| <input type="checkbox"/> BEDROCK [16 pt]                 | _____     | <input type="checkbox"/> FINE DETRITUS [3 pts]         | _____     |
| <input type="checkbox"/> COBBLE (65-256 mm) [12 pts]     | <u>10</u> | <input type="checkbox"/> CLAY or HARDPAN [0 pt]        | _____     |
| <input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]        | <u>20</u> | <input type="checkbox"/> MUCK [0 pts]                  | _____     |
| <input checked="" type="checkbox"/> SAND (<2 mm) [6 pts] | <u>30</u> | <input type="checkbox"/> ARTIFICIAL [3 pts]            | _____     |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 10 (A) 9 (B) 4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points

Substrate Max = 40

13

A + B

2. **Maximum Pool Depth** (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                             |                                                            |
|-------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts]          | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input checked="" type="checkbox"/> > 22.5 - 30 cm [30 pts] | <input type="checkbox"/> < 5 cm [5 pts]                    |
| <input type="checkbox"/> > 10 - 22.5 cm [25 pts]            | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS \_\_\_\_\_ MAXIMUM POOL DEPTH (centimeters): 25

Pool Depth Max = 30

30

3. **BANK FULL WIDTH** (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                     |                                                                     |
|---------------------------------------------------------------------|---------------------------------------------------------------------|
| <input checked="" type="checkbox"/> > 4.0 meters (> 13') [30 pts]   | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]   | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts] |                                                                     |

COMMENTS \_\_\_\_\_ AVERAGE BANKFULL WIDTH (meters) 6.2

Bankfull Width Max=30

30

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                      |                                     | FLOODPLAIN QUALITY                  |                                     |                          |                          |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| L                                   | R                                   | L                                   | R                                   | L                        | R                        |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| (Per Bank)                          |                                     | (Most Predominant per Bank)         |                                     | Conservation Tillage     |                          |
| Wide >10m                           |                                     | Mature Forest, Wetland              |                                     | <input type="checkbox"/> | Urban or Industrial      |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Open Pasture, Row Crop   |
| Moderate 5-10m                      |                                     | Immature Forest, Shrub or Old Field |                                     | <input type="checkbox"/> | Mining or Construction   |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |                          |                          |
| Narrow <5m                          |                                     | Residential, Park, New Field        |                                     |                          |                          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |                          |                          |
| None                                |                                     | Fenced Pasture                      |                                     |                          |                          |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            |                                     |                                     |                          |                          |

COMMENTS \_\_\_\_\_

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

|                                                                             |                                                                                |
|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Stream Flowing                          | <input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent) |
| <input type="checkbox"/> Subsurface flow with isolated pools (Interstitial) | <input type="checkbox"/> Dry channel, no water (Ephemeral)                     |

COMMENTS \_\_\_\_\_

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

|                               |                                         |                              |                              |
|-------------------------------|-----------------------------------------|------------------------------|------------------------------|
| <input type="checkbox"/> None | <input checked="" type="checkbox"/> 1.0 | <input type="checkbox"/> 2.0 | <input type="checkbox"/> 3.0 |
| <input type="checkbox"/> 0.5  | <input type="checkbox"/> 1.5            | <input type="checkbox"/> 2.5 | <input type="checkbox"/> >3  |

STREAM GRADIENT ESTIMATE

Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score 29.5 (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

WWH Name: FRENCH CREEK Distance from Evaluated Stream 3.45 MILES  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH NRCS Soil Map Page: 12 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LORAIN Township / City: SHEFFIELD

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: 8/19 Quantity: \_\_\_\_\_  
Photograph Information: \_\_\_\_\_  
Elevated Turbidity? (Y/N): N Canopy (% open): 95%  
Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_  
Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_  
Is the sampling reach representative of the stream (Y/N) Y If not, please explain: \_\_\_\_\_

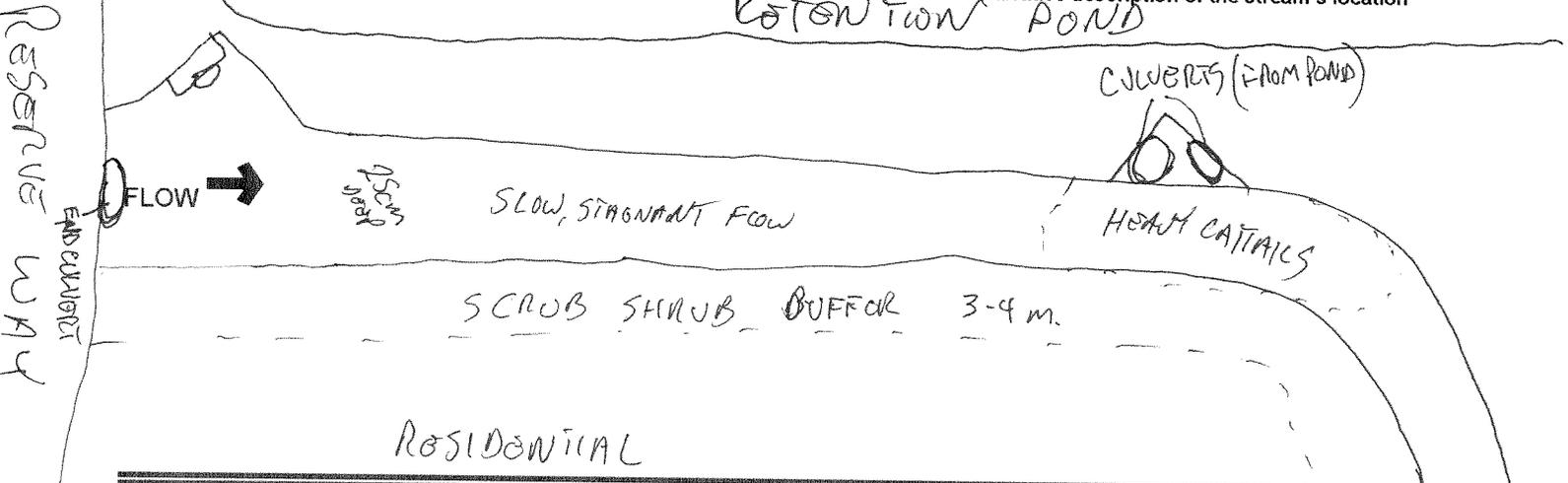
Additional comments/description of pollution impacts: ENDS IN RESIDENTIAL AREA, ADJACENT TO RETENTION POND (FOR STORM WATER + OVERLAND FLOW) - RECEIVES DISCHARGES FROM POND

**BIOTIC EVALUATION**

Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)  
Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Comments Regarding Biology: SOME FISH, FROGS, AND AQUATIC INSECTS WERE OBSERVED IN THIS STRETCH OF THE STREAM.

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



**KLINE DITCH NOTES**

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Kline Ditch 0.0  
Stream Segment Location: Mouth of Ditch (French Creek RM 3.9)  
QHEI Score: 65 HHEI Score: 58

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FIELD NOTES: 21 AUG 2002

Kline Ditch enters French Creek from the south to the south of Colorado Ave. The stretch is straight, 4-5' wide and flows over a hardpan substrate, with boulders, cobbles, gravel and sand at the immediate surface. The deepest point is 21 cm, with 10' high banks on both sides. The west bank is a shrub/field (power line right-of-way) dominated by gray-stemmed dogwood, multiflora rose, ragweed, goldenrod and field bindweed. The east bank is a 50' wide shrub/sapling area dominated by orchard grass, pussy willow, reed canary grass, tartarian honeysuckle, multiflora rose, quaking aspen and silky dogwood. There is a good mix of riffles and pools. Restoration potential exists.

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PHOTOS:



1) Kline Ditch 0.0 – Mouth of ditch facing upstream



2) Kline Ditch 0.0 – Facing downstream, 150' from mouth



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **65**

River Code: RM: 0.0 Stream: KLINE DITCH  
Date: 8-21-02 Location: MOUTH - AD FRENCH CREEK  
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

| TYPE                                                                | POOL RIFFLE                                                        | POOL RIFFLE                                     | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                 |
|---------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------|------------------|---------------------------------------------------|
| <input type="checkbox"/> BLDR /SLBS [10]                            | <input checked="" type="checkbox"/> GRAVEL [7] <u>30</u> <u>30</u> | Check ONE (OR 2 & AVERAGE)                      |                  | Check ONE (OR 2 & AVERAGE)                        |
| <input type="checkbox"/> BOULDER [9] <u>25</u> <u>25</u>            | <input type="checkbox"/> SAND [6]                                  | <input type="checkbox"/> LIMESTONE [1]          | SILT:            | <input type="checkbox"/> SILT HEAVY [-2]          |
| <input type="checkbox"/> COBBLE [8] <u>15</u> <u>15</u>             | <input type="checkbox"/> BEDROCK [5]                               | <input checked="" type="checkbox"/> TILLS [1]   |                  | <input type="checkbox"/> SILT MODERATE [-1]       |
| <input checked="" type="checkbox"/> HARDPAN [4] <u>30</u> <u>30</u> | <input type="checkbox"/> DETRITUS [3]                              | <input type="checkbox"/> WETLANDS [0]           |                  | <input type="checkbox"/> SILT NORMAL [0]          |
| <input type="checkbox"/> MUCK [2]                                   | <input type="checkbox"/> ARTIFICIAL [0]                            | <input checked="" type="checkbox"/> HARDPAN [0] |                  | <input checked="" type="checkbox"/> SILT FREE [1] |
| <input type="checkbox"/> SILT [2]                                   | NOTE: Ignore Sludge Originating From Point Sources                 | <input type="checkbox"/> SANDSTONE [0] EMBEDDED |                  | <input type="checkbox"/> EXTENSIVE [-2]           |
|                                                                     |                                                                    | <input type="checkbox"/> RIP/RAP [0] NESS:      |                  | <input type="checkbox"/> MODERATE [-1]            |
|                                                                     |                                                                    | <input type="checkbox"/> LACUSTRINE [0]         |                  | <input type="checkbox"/> NORMAL [0]               |
|                                                                     |                                                                    | <input type="checkbox"/> SHALE [-1]             |                  | <input checked="" type="checkbox"/> NONE [1]      |
|                                                                     |                                                                    | <input type="checkbox"/> COAL FINES [-2]        |                  |                                                   |

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
(High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)  
(Structure) TYPE: Score All That Occur

|                                       |                            |                                   |
|---------------------------------------|----------------------------|-----------------------------------|
| <u>1</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <u>0</u> OXBOWS, BACKWATERS [1]   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <u>1</u> AQUATIC MACROPHYTES [1]  |
| <u>1</u> SHALLOWS (IN SLOW WATER) [1] | <u>3</u> BOULDERS [1]      | <u>1</u> LOGS OR WOODY DEBRIS [1] |
| <u>2</u> ROOTMATS [1]                 | COMMENTS:                  |                                   |

AMOUNT: (Check ONLY One or check 2 and AVERAGE)

EXTENSIVE > 75% [11]  
 MODERATE 25-75% [7]  
 SPARSE 5-25% [3]  
 NEARLY ABSENT < 5% [1]

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                    | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY                                    | MODIFICATIONS/OTHER                                                                |
|----------------------------------------------|----------------------------------------------|----------------------------------------------------|----------------------------------------------|------------------------------------------------------------------------------------|
| <input type="checkbox"/> HIGH [4]            | <input type="checkbox"/> EXCELLENT [7]       | <input type="checkbox"/> NONE [6]                  | <input checked="" type="checkbox"/> HIGH [3] | <input type="checkbox"/> SNAGGING <input type="checkbox"/> IMPOUND.                |
| <input type="checkbox"/> MODERATE [3]        | <input checked="" type="checkbox"/> GOOD [5] | <input checked="" type="checkbox"/> RECOVERED [4]  | <input type="checkbox"/> MODERATE [2]        | <input checked="" type="checkbox"/> RELOCATION <input type="checkbox"/> ISLANDS    |
| <input type="checkbox"/> LOW [2]             | <input type="checkbox"/> FAIR [3]            | <input type="checkbox"/> RECOVERING [3]            | <input type="checkbox"/> LOW [1]             | <input type="checkbox"/> CANOPY REMOVAL <input type="checkbox"/> LEVEED            |
| <input checked="" type="checkbox"/> NONE [1] | <input type="checkbox"/> POOR [1]            | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                              | <input checked="" type="checkbox"/> DREDGING <input type="checkbox"/> BANK SHAPING |
|                                              |                                              |                                                    |                                              | <input checked="" type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS                 |

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

| RIPARIAN WIDTH                                           |                                                            | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)               |                                                  | BANK EROSION                                     |  |
|----------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--|
| L R (Per Bank)                                           | L R (Most Predominant Per Bank)                            | L R                                                         | L R (Per Bank)                                   | L R (Per Bank)                                   |  |
| <input type="checkbox"/> WIDE > 50m [4]                  | <input type="checkbox"/> FOREST, SWAMP [3]                 | <input type="checkbox"/> CONSERVATION TILLAGE [1]           | <input type="checkbox"/> NONE/LITTLE [3]         | <input type="checkbox"/> NONE/LITTLE [3]         |  |
| <input checked="" type="checkbox"/> MODERATE 10-50m [3]  | <input checked="" type="checkbox"/> SHRUB OR OLD FIELD [2] | <input checked="" type="checkbox"/> URBAN OR INDUSTRIAL [0] | <input checked="" type="checkbox"/> MODERATE [2] | <input checked="" type="checkbox"/> MODERATE [2] |  |
| <input type="checkbox"/> NARROW 5-10 m [2]               | <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]  | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0]          | <input type="checkbox"/> HEAVY/SEVERE [1]        | <input type="checkbox"/> HEAVY/SEVERE [1]        |  |
| <input checked="" type="checkbox"/> VERY NARROW <5 m [1] | <input type="checkbox"/> FENCED PASTURE [1]                | <input type="checkbox"/> MINING/CONSTRUCTION [0]            |                                                  |                                                  |  |
| <input type="checkbox"/> NONE [0]                        |                                                            |                                                             |                                                  |                                                  |  |

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH                                       | MORPHOLOGY                                                        | CURRENT VELOCITY ( POOLS & RIFFLES! )                                                       |
|--------------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| (Check 1 ONLY!)                                  | (Check 1 or 2 & AVERAGE)                                          | (Check All That Apply)                                                                      |
| <input type="checkbox"/> >1m [6]                 | <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]            | <input type="checkbox"/> EDDIES [1] <input type="checkbox"/> TORRENTIAL [-1]                |
| <input type="checkbox"/> 0.7-1m [4]              | <input checked="" type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> FAST [1] <input type="checkbox"/> INTERSTITIAL [-1]                |
| <input type="checkbox"/> 0.4-0.7m [2]            | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]               | <input checked="" type="checkbox"/> MODERATE [1] <input type="checkbox"/> INTERMITTENT [-2] |
| <input checked="" type="checkbox"/> 0.2-0.4m [1] |                                                                   | <input checked="" type="checkbox"/> SLOW [1] <input type="checkbox"/> VERY FAST [1]         |
| <input type="checkbox"/> < 0.2m [POOL=0]         | COMMENTS:                                                         |                                                                                             |

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                               | RUN DEPTH                                        | RIFFLE/RUN SUBSTRATE                                                   | RIFFLE/RUN EMBEDDEDNESS                      |
|------------------------------------------------------------|--------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------|
| <input type="checkbox"/> Best Areas >10 cm [2]             | <input type="checkbox"/> MAX > 50 [2]            | <input checked="" type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] | <input checked="" type="checkbox"/> NONE [2] |
| <input checked="" type="checkbox"/> Best Areas 5-10 cm [1] | <input checked="" type="checkbox"/> MAX < 50 [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]          | <input type="checkbox"/> LOW [1]             |
| <input type="checkbox"/> Best Areas < 5 cm [RIFFLE=0]      |                                                  | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]              | <input type="checkbox"/> MODERATE [0]        |
|                                                            |                                                  |                                                                        | <input type="checkbox"/> EXTENSIVE [-1]      |
| COMMENTS:                                                  |                                                  | <input type="checkbox"/> NO RIFFLE [Metric=0]                          |                                              |

6) GRADIENT (ft/mi): 17.4 DRAINAGE AREA (sq.mi.): 1.0  
% POOL: 30 % GLIDE: 10  
% RIFFLE: 35 % RUN: 25

\*\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:

- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Width | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|-----------------|
|               |               |               |                    |                |                |                    |                 |                 |                 |

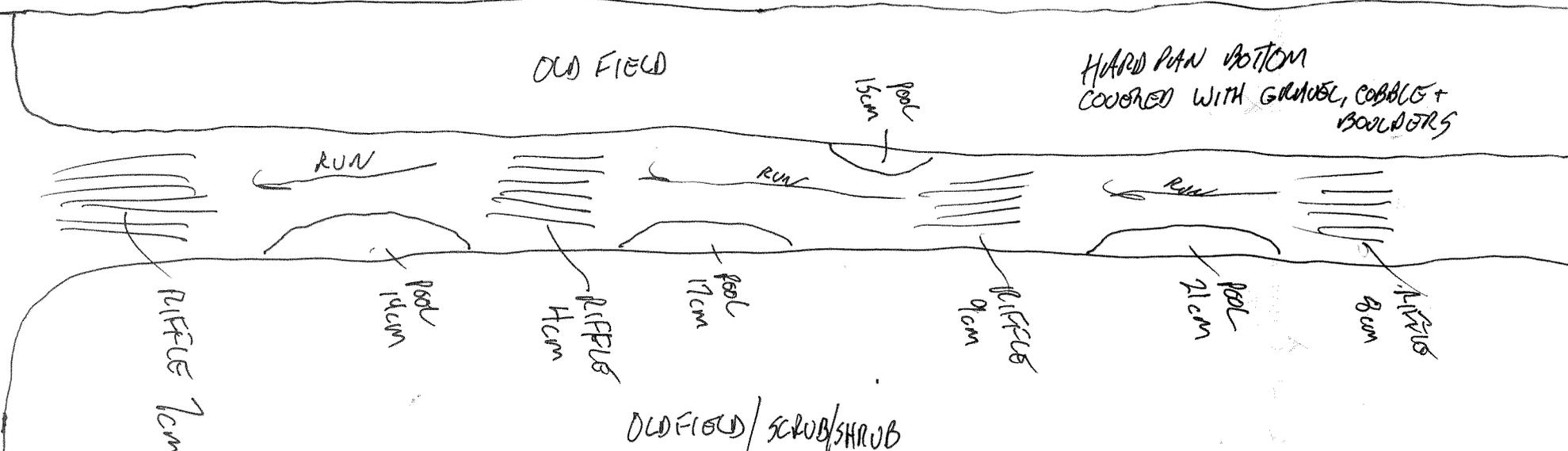
**Stream Drawing:**

ACCESS ROAD

OLD FIELD

HARD PAN BOTTOM COVERED WITH GRASS, COBBLES + BOULDERS

FENCE CRACK



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

58

SITE NAME/LOCATION KLINE DITCH AT THE MOUTH (FELSNCH CREEK)  
 SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 1.0  
 LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 0.0  
 DATE 8-21-02 SCORER JAY MILLER COMMENTS \_\_\_\_\_

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY  
 MODIFICATIONS:

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                                                  | PERCENT   | TYPE                                                                                | PERCENT   |
|---------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------|-----------|
| <input type="checkbox"/> <input type="checkbox"/> BLDR SLABS [16 pts]                 |           | <input type="checkbox"/> <input type="checkbox"/> SILT [3 pt]                       |           |
| <input type="checkbox"/> <input type="checkbox"/> BOULDER (>256 mm) [16 pts]          | <u>25</u> | <input type="checkbox"/> <input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]    |           |
| <input type="checkbox"/> <input type="checkbox"/> BEDROCK [16 pt]                     |           | <input type="checkbox"/> <input type="checkbox"/> FINE DETRITUS [3 pts]             |           |
| <input type="checkbox"/> <input type="checkbox"/> COBBLE (65-256 mm) [12 pts]         | <u>15</u> | <input type="checkbox"/> <input checked="" type="checkbox"/> CLAY or HARDPAN [0 pt] | <u>30</u> |
| <input checked="" type="checkbox"/> <input type="checkbox"/> GRAVEL (2-64 mm) [9 pts] | <u>30</u> | <input type="checkbox"/> <input checked="" type="checkbox"/> MUCK [0 pts]           |           |
| <input type="checkbox"/> <input type="checkbox"/> SAND (<2 mm) [6 pts]                |           | <input type="checkbox"/> <input type="checkbox"/> ARTIFICIAL [3 pts]                |           |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 40 (A) 9 (B) 4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points

Substrate Max = 40

13

A + B

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                             |                                                            |
|-------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts]          | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]            | <input type="checkbox"/> < 5 cm [5 pts]                    |
| <input checked="" type="checkbox"/> > 10 - 22.5 cm [25 pts] | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS \_\_\_\_\_ MAXIMUM POOL DEPTH (centimeters): 21

Pool Depth Max = 30

25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                                |                                                                     |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                         | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]              | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts] |                                                                     |

COMMENTS VIRTUALLY UNIFORM WIDTH ALONG STRETCH AVERAGE BANKFULL WIDTH (meters) 2.2

Bankfull Width Max=30

20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                      |                                     | FLOODPLAIN QUALITY                  |                                     |                          |                                     |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|
| L                                   | R                                   | L                                   | R                                   | L                        | R                                   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            |
| (Per Bank)                          |                                     | (Most Predominant per Bank)         |                                     | Conservation Tillage     |                                     |
| Wide >10m                           |                                     | Mature Forest, Wetland              |                                     | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Moderate 5-10m                      |                                     | Immature Forest, Shrub or Old Field |                                     | Urban or Industrial      |                                     |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            |
| Narrow <5m                          |                                     | Residential, Park, New Field        |                                     | Open Pasture, Row Crop   |                                     |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/>            |
| None                                |                                     | Fenced Pasture                      |                                     | Mining or Construction   |                                     |

COMMENTS \_\_\_\_\_

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):  
 Stream Flowing  Moist Channel, isolated pools, no flow (Intermittent)  
 Subsurface flow with isolated pools (Interstitial)  Dry channel, no water (Ephemeral)  
 COMMENTS \_\_\_\_\_

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):  
 None  1.0  2.0  3.0  
 0.5  1.5  2.5  >3

STREAM GRADIENT ESTIMATE  
 Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score 65 (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

WWH Name: FRENCH CREEK Distance from Evaluated Stream 0.0 MILES  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH NRCS Soil Map Page: 7 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LORAIN Township / City: AVON

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: 8/19 Quantity: \_\_\_\_\_

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): N Canopy (% open): 60

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_

Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: RUNS ADJACENT TO AN ACCESS ROAD FOR A POWER FACILITY?

**BIOTIC EVALUATION**

Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_

Comments Regarding Biology: SIGNIFICANT AMOUNT OF FISH AND AQUATIC INSECTS NOTED VISUALLY DURING INVESTIGATION

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location

FLOW → SEE QHEI SHEET

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Kline Ditch 0.85  
Stream Segment Location: At Greenfield Drive  
QHEI Score: NA HHEI Score: 46

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**FIELD NOTES:**

This portion of Kline Ditch is located south of Greenfield Drive, a stub road in a residential subdivision. The 6-8' wide ditch has been channelized and dredged, apparently at the time of the subdivision construction. The ditch crosses I-90 approximately 600-800 feet to the north. The east bank has no buffer with maintained lawns to the homes. The west bank has a 15-20' wide tree line with red oak, black cherry, and apple trees. A soybean field is located beyond the tree line. The channel is vegetated, mostly by rice cutgrass, with smaller amounts of spotted touch-me-not, purple loosestrife, and duck potato. Maximum depth was 8 cm. and the substrate is dominated by silt and muck, with some detritus. The opportunity for restoration includes tree plantings and buffer formation along the east bank. However, it is unlikely that this is realistic due to the many landowners and fact that residents would have to sacrifice lawn area.

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**PHOTOS:**



1) Kline Ditch 0.85 – Facing south from Greenfield Drive



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

46

SITE NAME/LOCATION KLINE DITCH AT GREENFIELD DRIVE  
 SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 0.4  
 LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 0.85  
 DATE 8-22-02 SCORER JAY MILLOR COMMENTS RUNS THROUGH RESIDENTIAL DEVELOPMENT

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY  
 MODIFICATIONS:

1. **SUBSTRATE** (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                 | PERCENT | TYPE                                                    | PERCENT   |
|------------------------------------------------------|---------|---------------------------------------------------------|-----------|
| <input type="checkbox"/> BLDR SLABS [16 pts]         | _____   | <input checked="" type="checkbox"/> SILT [3 pt]         | <u>40</u> |
| <input type="checkbox"/> BOULDER (>256 mm) [16 pts]  | _____   | <input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts] | _____     |
| <input type="checkbox"/> BEDROCK [16 pt]             | _____   | <input type="checkbox"/> FINE DETRITUS [3 pts]          | <u>20</u> |
| <input type="checkbox"/> COBBLE (65-256 mm) [12 pts] | _____   | <input type="checkbox"/> CLAY or HARDPAN [0 pt]         | _____     |
| <input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]    | _____   | <input type="checkbox"/> MUCK [0 pts]                   | <u>40</u> |
| <input type="checkbox"/> SAND (<2 mm) [6 pts]        | _____   | <input type="checkbox"/> ARTIFICIAL [3 pts]             | _____     |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 0

(A) 3

(B) 3

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points

Substrate Max = 40

6

A + B

2. **Maximum Pool Depth** (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                    |                                                             |
|----------------------------------------------------|-------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts] | <input checked="" type="checkbox"/> > 5 cm - 10 cm [15 pts] |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]   | <input type="checkbox"/> < 5 cm [5 pts]                     |
| <input type="checkbox"/> > 10 - 22.5 cm [25 pts]   | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts]  |

COMMENTS

COMPLETELY VEGETATED (MOW-CUT GRASS) CHANNEL  
SLOW - STAGNANT FLOW

MAXIMUM POOL DEPTH (centimeters):

8cm

Pool Depth Max = 30

15

3. **BANK FULL WIDTH** (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                              |                                                                     |
|------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                       | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input checked="" type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts] | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]          |                                                                     |

COMMENTS

CHANNELIZED - UNIFORM WIDTH

AVERAGE BANKFULL WIDTH (meters)

3.3m

Bankfull Width Max=30

25

This information must also be completed

### RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                      |                                     | FLOODPLAIN QUALITY                  |                                     |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| L                                   | R                                   | L                                   | R                                   |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| (Per Bank)                          |                                     | (Most Predominant per Bank)         |                                     |
| Wide >10m                           |                                     | Mature Forest, Wetland              | <input type="checkbox"/>            |
| Moderate 5-10m                      |                                     | Immature Forest, Shrub or Old Field | <input type="checkbox"/>            |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Residential, Park, New Field        | <input checked="" type="checkbox"/> |
| Narrow <5m                          |                                     | Fenced Pasture                      | <input type="checkbox"/>            |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            |                                     | <input type="checkbox"/>            |
| None                                |                                     |                                     | <input type="checkbox"/>            |
|                                     |                                     |                                     | <input type="checkbox"/>            |
|                                     |                                     |                                     | <input type="checkbox"/>            |

COMMENTS MOWED TO BANKS ON LEFT, ROW CROPS (CORN) ON RIGHT

**FLOW REGIME** (At Time of Evaluation) (Check ONLY one box):

|                                                                             |                                                                                |
|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> Stream Flowing                          | <input type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent) |
| <input type="checkbox"/> Subsurface flow with isolated pools (Interstitial) | <input type="checkbox"/> Dry channel, no water (Ephemeral)                     |

COMMENTS \_\_\_\_\_

**SINUOSITY** (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

|                                          |                              |                              |                              |
|------------------------------------------|------------------------------|------------------------------|------------------------------|
| <input checked="" type="checkbox"/> None | <input type="checkbox"/> 1.0 | <input type="checkbox"/> 2.0 | <input type="checkbox"/> 3.0 |
| <input type="checkbox"/> 0.5             | <input type="checkbox"/> 1.5 | <input type="checkbox"/> 2.5 | <input type="checkbox"/> >3  |

### STREAM GRADIENT ESTIMATE

Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score \_\_\_\_\_ (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

WWH Name: FRENCH CREEK Distance from Evaluated Stream 0.85 mi  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH NRCS Soil Map Page: 7 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LORAIN Township / City: SHEFFIELD

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: 8/19 Quantity: \_\_\_\_\_  
Photograph Information: \_\_\_\_\_  
Elevated Turbidity? (Y/N): N Canopy (% open): 95%  
Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_  
Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_  
Is the sampling reach representative of the stream (Y/N) Y If not, please explain: \_\_\_\_\_

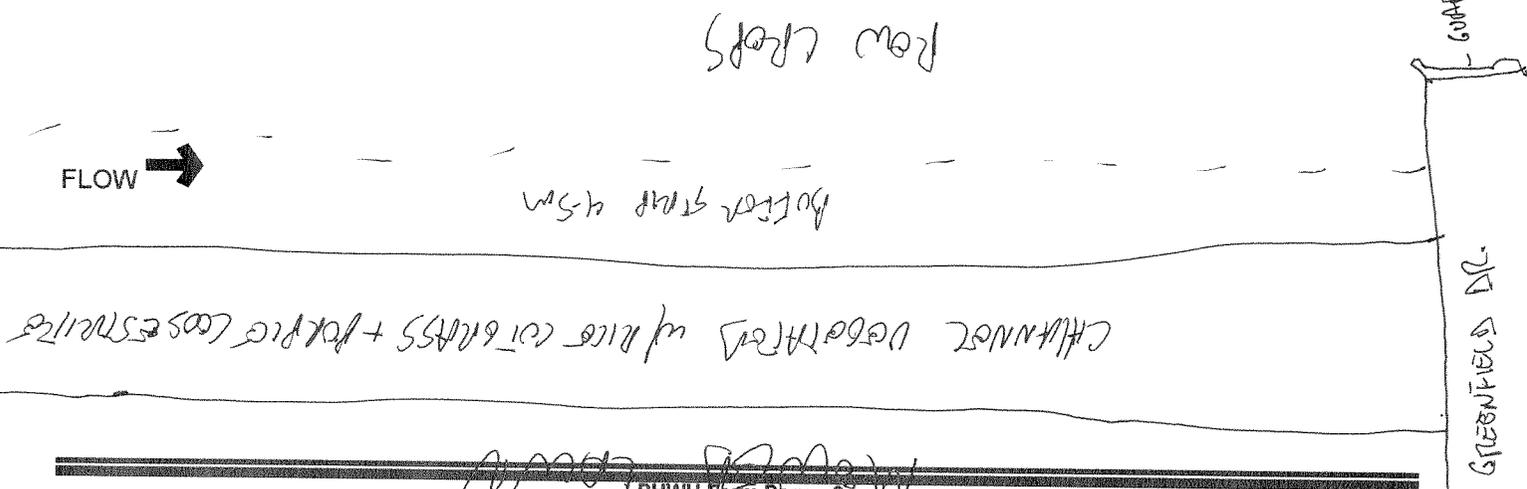
Additional comments/description of pollution impacts: STRAIGHT CHANNEL BEHIND RESIDENTIAL DEVELOPMENT, SEPARATION BY A SMALL (4-5m) BUFFER STRIP FROM ROW CROPS

**BIOTIC EVALUATION**

Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)  
Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Comments Regarding Biology: \_\_\_\_\_

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Kline Ditch 1.22  
Stream Segment Location: At French Creek Road  
QHEI Score: 32.75 HHEI Score: 50

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FIELD NOTES: 22 AUG 2002

This portion of Kline Ditch is located on the south side of French Creek Road. Each bank has a wooded/shrub buffer dominated by American elm, staghorn sumac, reed canary grass, multiflora rose, black cherry, spotted touch-me-nots, northern arrowwood, silky dogwood, gray-stemmed dogwood and red oak. The channel is generally un-vegetated (8-10'), but a few patches of rice cutgrass exist. The substrate is dominated by silt and hardpan clay. Old-field is the dominant habitat beyond the woody buffer. Many frogs were seen in the ditch. No restoration opportunities were noted, although a series of agricultural ditches empty into the ditch, which is a source of siltation and pesticide/eutrophication input.

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PHOTOS:



1) Kline Ditch 1.22 - Facing upstream from French Creek Road



2) Kline Ditch 1.22 – Facing downstream from French Creek Road (150' from photo 1)



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

32 3/4

River Code: RM: 1.22 Stream: KLINE DITCH
Date: 8-22-02 Location: AT FRENCH CREEK ROAD
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
BLDR /SLBS[10] GRAVEL [7] SAND [6] LESTONE [1] SILT:
COBBLE [8] BEDROCK[5] TILLS [1]
HARDPAN [4] 35 35 DETRITUS[3] WETLANDS[0]
MUCK [2] ARTIFICIAL[0] HARDPAN [0]
SILT [2] 65 65 NOTE: Ignore Sludge Originating From Point Sources
SANDSTONE [0] EMBEDDED
RIP/RAP [0] NESS:
LACUSTRINE [0]
SHALE [-1]
COAL FINES [-2]

NUMBER OF SUBSTRATE TYPES: 4 or More [2] 3 or Less [0]

COMMENTS:

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions) TYPE: Score All That Occur

UNDERCUT BANKS [1] POOLS > 70 cm [2] OXBOWS, BACKWATERS [1]
OVERHANGING VEGETATION [1] ROOTWADS [1] AQUATIC MACROPHYTES [1]
SHALLOWS (IN SLOW WATER) [1] BOULDERS [1] LOGS OR WOODY DEBRIS [1]
ROOTMATS [1] COMMENTS:

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
HIGH [4] EXCELLENT [7] NONE [6] HIGH [3] SNAGGING IMPOUND.
MODERATE [3] GOOD [5] RECOVERED [4] MODERATE [2] RELOCATION ISLANDS
LOW [2] FAIR [3] RECOVERING [3] LOW [1] CANOPY REMOVAL LEVEED
NONE [1] POOR [1] RECENT OR NO RECOVERY [1] DREDGING BANK SHAPING
ONE SIDE CHANNEL MODIFICATIONS

COMMENTS:

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION
WIDE > 50m [4] FOREST, SWAMP [3] CONSERVATION TILLAGE [1] NONE/LITTLE [3]
MODERATE 10-50m [3] SHRUB OR OLD FIELD [2] URBAN OR INDUSTRIAL [0] MODERATE [2]
NARROW 5-10 m [2] RESIDENTIAL, PARK, NEW FIELD [1] OPEN PASTURE, ROWCROP [0] HEAVY/SEVERE [1]
VERY NARROW <5 m [1] FENCED PASTURE [1] MINING/CONSTRUCTION [0]
NONE [0]

COMMENTS:

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [ POOLS & RIFFLES!]
>1m [6] POOL WIDTH > RIFFLE WIDTH [2] EDDIES[1] TORRENTIAL[-1]
0.7-1m [4] POOL WIDTH = RIFFLE WIDTH [1] FAST[1] INTERSTITIAL[-1]
0.4-0.7m [2] POOL WIDTH < RIFFLE W. [0] MODERATE [1] INTERMITTENT[-2]
0.2-0.4m [1] SLOW [1] VERY FAST[1]
< 0.2m [POOL=0] COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS
Best Areas >10 cm [2] MAX > 50 [2] STABLE (e.g., Cobble, Boulder) [2] NONE [2]
Best Areas 5-10 cm [1] MAX < 50 [1] MOD. STABLE (e.g., Large Gravel) [1] LOW [1]
Best Areas < 5 cm [RIFFLE=0] UNSTABLE (Fine Gravel, Sand) [0] MODERATE [0]
EXTENSIVE [-1]
NO RIFFLE [Metric=0]

COMMENTS:

6] GRADIENT (ft/mi): 12.7 DRAINAGE AREA (sq.mi.): 0.2 %POOL: 20 %GLIDE: 60 %RIFFLE: 10 %RUN: 10

\*\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:  - Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

| Stream Measurements: |               |               |                    |                     |           |                    |                 |                 |                 |  |  |
|----------------------|---------------|---------------|--------------------|---------------------|-----------|--------------------|-----------------|-----------------|-----------------|--|--|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Mean Depth | W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Width | Entrench. Ratio |  |  |
|                      |               |               |                    |                     |           |                    |                 |                 |                 |  |  |

**Stream Drawing:**

*SEE HHEI SHEET*

Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3):

50

SITE NAME/LOCATION KLINE DITCH AT FRENCH CREEK ROAD  
 SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 0.2  
 LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 1.22  
 DATE 9-22-02 SCORER JAY MILLER COMMENTS \_\_\_\_\_

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY  
 MODIFICATIONS:

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                 | PERCENT | TYPE                                                       | PERCENT   |
|------------------------------------------------------|---------|------------------------------------------------------------|-----------|
| <input type="checkbox"/> BLDR SLABS [16 pts]         | _____   | <input checked="" type="checkbox"/> SILT [3 pt]            | <u>65</u> |
| <input type="checkbox"/> BOULDER (>256 mm) [16 pts]  | _____   | <input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]    | _____     |
| <input type="checkbox"/> BEDROCK [16 pt]             | _____   | <input type="checkbox"/> FINE DETRITUS [3 pts]             | _____     |
| <input type="checkbox"/> COBBLE (65-256 mm) [12 pts] | _____   | <input checked="" type="checkbox"/> CLAY or HARDPAN [0 pt] | <u>35</u> |
| <input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]    | _____   | <input type="checkbox"/> MUCK [0 pts]                      | _____     |
| <input type="checkbox"/> SAND (<2 mm) [6 pts]        | _____   | <input type="checkbox"/> ARTIFICIAL [3 pts]                | _____     |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 0 (A) 3 (B) 7

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points

Substrate Max = 40

5

A + B

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                             |                                                            |
|-------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts]          | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]            | <input type="checkbox"/> < 5 cm [5 pts]                    |
| <input checked="" type="checkbox"/> > 10 - 22.5 cm [25 pts] | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS MOSTLY SHALLOW, BUT SOME ISOLATED 10-15cm POOLS MAXIMUM POOL DEPTH (centimeters): 15cm

Pool Depth Max = 30

25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                                |                                                                     |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                         | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]              | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts] |                                                                     |

COMMENTS AVERAGE OF 2.5, BUT SOME VERY NARROW - SOME WIDER AVERAGE BANKFULL WIDTH (meters) 2.5

Bankfull Width Max=30

20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                      |                                     | FLOODPLAIN QUALITY                  |                                     |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| L                                   | R                                   | L                                   | R                                   |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Wide >10m                           |                                     | Mature Forest, Wetland              | Conservation Tillage                |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| Moderate 5-10m                      |                                     | Immature Forest, Shrub or Old Field | Urban or Industrial                 |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Narrow <5m                          |                                     | Residential, Park, New Field        | Open Pasture, Row Crop              |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            |
| None                                |                                     | Fenced Pasture                      | Mining or Construction              |

COMMENTS RIGHT BANK - FARMER HAS ONE DRAINAGE DITCHES TO KLINE, ONE ON LEFT

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):  
 Stream Flowing  Moist Channel, isolated pools, no flow (Intermittent)  
 Subsurface flow with isolated pools (Interstitial)  Dry channel, no water (Ephemeral)  
 COMMENTS VERY SLOW FLOW

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):  
 None  1.0  2.0  3.0  
 0.5  1.5  2.5  >3

STREAM GRADIENT ESTIMATE  
 Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score 32 3/4 (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

VWH Name: FRENCH CREEK Distance from Evaluated Stream 1.22 MILES  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH NRCS Soil Map Page: 7 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LORAIN Township / City: SHEFFIELD

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: 8/19 Quantity: \_\_\_\_\_

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): N Canopy (% open): 20

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_

Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: DITCH IMPACTS FROM ROW CROP FIELDS

**BIOTIC EVALUATION**

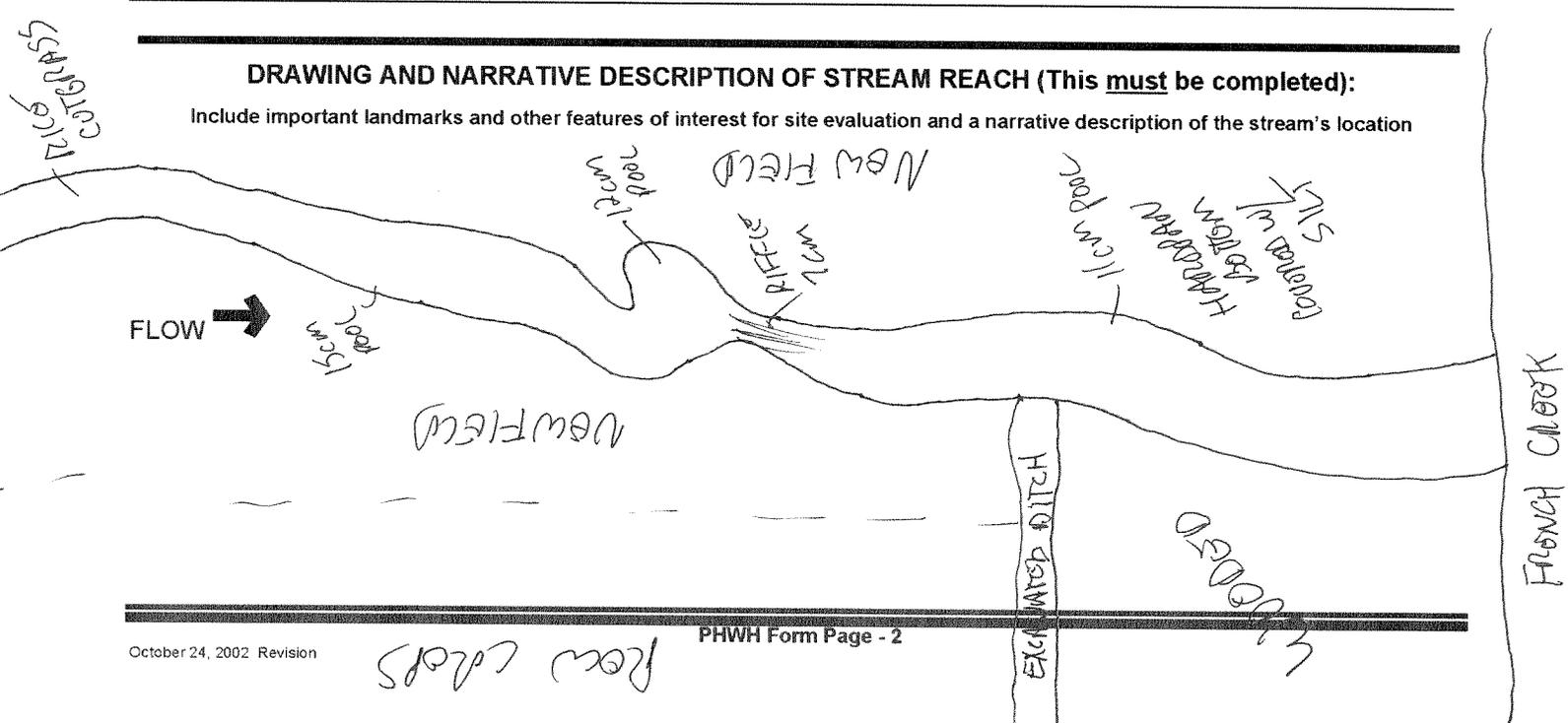
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_

Comments Regarding Biology: \_\_\_\_\_

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



*Rec'd colors*

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Kline Ditch 2.15

Stream Segment Location: At Detroit Road

QHEI Score: 51.5

HHEI Score: 74

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**FIELD NOTES:**

This site is located to the southwest of Detroit Road and includes a portion of Kline Ditch that was not flowing. Several pools were present although apparently contaminated. The banks and gradient were fairly steep. The banks were 15' +/- high. Several PVC pipes were discharging water from adjacent properties (possibly effluent). The channel was 8-12' wide with a substrate of cobbles, boulders, gravel and sand with some silt. The east side was 20' +/- wide before encountering residential lawn. The west riparian area is 50-100' wide. The dominant species noted include silver maple, Norway maple, multiflora rose and staghorn sumac. Small areas of spotted touch-me-not were noted in the channel. There is a great potential for restoration at this site by cleaning up the effluent and repairing the septic systems.

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**PHOTOS:**



1) Kline Ditch 2.15 – Facing upstream (southeast) from Detroit Road



2) Kline Ditch 2.15 – Facing downstream toward Detroit Road



3) Kline Ditch 2.15 – Pool of contamination (possibly raw sewage?)



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **5 1/2**

River Code: RM: 2.15 Stream: KLINE DITCH  
Date: 8-22-02 Location: AT DETROIT ROAD  
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

| TYPE                                                         | POOL RIFFLE                                               | POOL RIFFLE                                      | SUBSTRATE ORIGIN                                   | SUBSTRATE QUALITY                                       |
|--------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|---------------------------------------------------------|
| <input type="checkbox"/> -BLDR /SLBS[10]                     | <input checked="" type="checkbox"/> -GRAVEL [7] <b>30</b> | Check ONE (OR 2 & AVERAGE)                       |                                                    | Check ONE (OR 2 & AVERAGE)                              |
| <input checked="" type="checkbox"/> -BOULDER [9] <b>30</b>   | <input type="checkbox"/> -SAND [6]                        | <input type="checkbox"/> -LIMESTONE [1]          | SILT:                                              | <input type="checkbox"/> -SILT HEAVY [-2]               |
| <input type="checkbox"/> -COBBLE [8] <b>20</b>               | <input type="checkbox"/> -BEDROCK[5]                      | <input checked="" type="checkbox"/> -TILLS [1]   | <input type="checkbox"/> -WETLANDS[0]              | <input checked="" type="checkbox"/> -SILT MODERATE [-1] |
| <input type="checkbox"/> -HARDPAN [4]                        | <input type="checkbox"/> -DETRITUS[3]                     | <input type="checkbox"/> -WETLANDS[0]            | <input type="checkbox"/> -HARDPAN [0]              | <input type="checkbox"/> -SILT NORMAL [0]               |
| <input type="checkbox"/> -MUCK [2]                           | <input type="checkbox"/> -ARTIFICIAL[0]                   | <input type="checkbox"/> -SANDSTONE [0] EMBEDDED | <input type="checkbox"/> -SILT FREE [1]            | <input type="checkbox"/> -EXTENSIVE [-2]                |
| <input type="checkbox"/> -SILT [2] <b>20</b>                 | NOTE: Ignore Sludge Originating From Point Sources        | <input type="checkbox"/> -RIP/RAP [0] NESS:      | <input checked="" type="checkbox"/> -MODERATE [-1] | <input type="checkbox"/> -NORMAL [0]                    |
| NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >) |                                                           | <input type="checkbox"/> -LACUSTRINE [0]         | <input type="checkbox"/> -NONE [1]                 |                                                         |
| <input type="checkbox"/> 4 or More [2]                       |                                                           | <input type="checkbox"/> -SHALE [-1]             |                                                    |                                                         |
| <input checked="" type="checkbox"/> 3 or Less [0]            |                                                           | <input type="checkbox"/> -COAL FINES [-2]        |                                                    |                                                         |

COMMENTS: NO RIFFLE

Substrate  
**15**  
Max 20

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| (Structure)                           | TYPE: Score All That Occur | AMOUNT: (Check ONLY One or check 2 and AVERAGE)  |
|---------------------------------------|----------------------------|--------------------------------------------------|
| <u>0</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <input type="checkbox"/> - EXTENSIVE > 75% [11]  |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <input type="checkbox"/> - MODERATE 25-75% [7]   |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>3</u> BOULDERS [1]      | <input type="checkbox"/> - SPARSE 5-25% [3]      |
| <u>0</u> ROOTMATS [1]                 | COMMENTS:                  | <input type="checkbox"/> - NEARLY ABSENT < 5%[1] |

Cover  
**9**  
Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                          | DEVELOPMENT                                    | CHANNELIZATION                                       | STABILITY                                      | MODIFICATIONS/OTHER                                       |
|----------------------------------------------------|------------------------------------------------|------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------|
| <input type="checkbox"/> - HIGH [4]                | <input type="checkbox"/> - EXCELLENT [7]       | <input checked="" type="checkbox"/> - NONE [6]       | <input checked="" type="checkbox"/> - HIGH [3] | <input type="checkbox"/> - SNAGGING                       |
| <input checked="" type="checkbox"/> - MODERATE [3] | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]             | <input type="checkbox"/> - MODERATE [2]        | <input type="checkbox"/> - RELOCATION                     |
| <input type="checkbox"/> - LOW [2]                 | <input type="checkbox"/> - FAIR [3]            | <input type="checkbox"/> - RECOVERING [3]            | <input type="checkbox"/> - LOW [1]             | <input type="checkbox"/> - CANOPY REMOVAL                 |
| <input type="checkbox"/> - NONE [1]                | <input checked="" type="checkbox"/> - POOR [1] | <input type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                                | <input type="checkbox"/> - LEVEED                         |
|                                                    |                                                |                                                      |                                                | <input type="checkbox"/> - DREDGING                       |
|                                                    |                                                |                                                      |                                                | <input type="checkbox"/> - BANK SHAPING                   |
|                                                    |                                                |                                                      |                                                | <input type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS |

Channel  
**13**  
Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

| RIPARIAN WIDTH                                             | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)                          | BANK EROSION                                       |
|------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------|
| L R (Per Bank)                                             | L R (Most Predominant Per Bank)                                        | L R (Per Bank)                                     |
| <input type="checkbox"/> - WIDE > 50m [4]                  | <input type="checkbox"/> - FOREST, SWAMP [3]                           | <input type="checkbox"/> - NONE/LITTLE [3]         |
| <input type="checkbox"/> - MODERATE 10-50m [3]             | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]                      | <input checked="" type="checkbox"/> - MODERATE [2] |
| <input checked="" type="checkbox"/> - NARROW 5-10 m [2]    | <input checked="" type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> - HEAVY/SEVERE [1]        |
| <input checked="" type="checkbox"/> - VERY NARROW <5 m [1] | <input type="checkbox"/> - FENCED PASTURE [1]                          | <input type="checkbox"/> - MINING/CONSTRUCTION [0] |
| <input type="checkbox"/> - NONE [0]                        |                                                                        |                                                    |

Riparian  
**4 1/2**  
Max 10

COMMENTS:

5.) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                            | MORPHOLOGY (Check 1 or 2 & AVERAGE)                      | CURRENT VELOCITY [ POOLS & RIFFLES! ] (Check All That Apply) |
|-------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------|
| <input type="checkbox"/> - >1m [6]                    | <input type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> - EDDIES[1]                         |
| <input type="checkbox"/> - 0.7-1m [4]                 | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> - TORRENTIAL[-1]                    |
| <input type="checkbox"/> - 0.4-0.7m [2]               | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]    | <input type="checkbox"/> - INTERSTITIAL[-1]                  |
| <input type="checkbox"/> - 0.2- 0.4m [1]              |                                                          | <input type="checkbox"/> - INTERMITTENT[-2]                  |
| <input checked="" type="checkbox"/> - < 0.2m [POOL=0] | COMMENTS:                                                | <input type="checkbox"/> - SLOW [1]                          |
|                                                       |                                                          | <input type="checkbox"/> - VERY FAST[1]                      |

Pool/Current  
**0**  
Max 12

| CHECK ONE OR CHECK 2 AND AVERAGE                        |                                         |                                                                 |                                           |
|---------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|-------------------------------------------|
| RIFFLE DEPTH                                            | RUN DEPTH                               | RIFFLE/RUN SUBSTRATE                                            | RIFFLE/RUN EMBEDDEDNESS                   |
| <input type="checkbox"/> - Best Areas >10 cm [2]        | <input type="checkbox"/> - MAX > 50 [2] | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> - NONE [2]       |
| <input type="checkbox"/> - Best Areas 5-10 cm [1]       | <input type="checkbox"/> - MAX < 50 [1] | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> - LOW [1]        |
| <input type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0] |                                         | <input type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> - MODERATE [0]   |
|                                                         |                                         |                                                                 | <input type="checkbox"/> - EXTENSIVE [-1] |

Riffle/Run  
**0**  
Max 8

COMMENTS:

- NO RIFFLE [Metric=0]

Gradient  
**10**  
Max 10

6) GRADIENT (ft/mi): 16.7 DRAINAGE AREA (sq.mi.): 0.1

%POOL:  %GLIDE:   
%RIFFLE:  %RUN:

\* Best areas must be large enough to support a population of riffle-obligate species

NO FLOW  
ISOLATED POOLS

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:

- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

| Stream Measurements: |               |               |                    |                |                |                    |                 |       |                 |
|----------------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-------|-----------------|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Width | Entrench. Ratio |
|                      |               |               |                    |                |                |                    |                 |       |                 |

**Stream Drawing:**

SEE HHEI SHOOT

Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

**Yes/No**

- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
- Is there water upstream? How Far: \_\_\_\_\_
- Is There Water Close Downstream? How Far: \_\_\_\_\_
- Is Dry Channel Mostly Natural?



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

74

SITE NAME/LOCATION KLING DITCH AT DETROIT ROAD (RT. 254)  
 SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 0.1  
 LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 2.15  
 DATE 9-22-02 SCORER JAY MILLER COMMENTS \_\_\_\_\_

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY  
 MODIFICATIONS:

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                           | PERCENT   | TYPE                                                    | PERCENT   |
|----------------------------------------------------------------|-----------|---------------------------------------------------------|-----------|
| <input type="checkbox"/> BLDR SLABS [16 pts]                   |           | <input type="checkbox"/> SILT [3 pt]                    | <u>20</u> |
| <input checked="" type="checkbox"/> BOULDER (>256 mm) [16 pts] | <u>30</u> | <input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts] |           |
| <input type="checkbox"/> BEDROCK [16 pt]                       |           | <input type="checkbox"/> FINE DETRITUS [3 pts]          |           |
| <input type="checkbox"/> COBBLE (65-256 mm) [12 pts]           | <u>20</u> | <input type="checkbox"/> CLAY or HARDPAN [0 pt]         |           |
| <input checked="" type="checkbox"/> GRAVEL (2-64 mm) [9 pts]   | <u>30</u> | <input type="checkbox"/> MUCK [0 pts]                   |           |
| <input type="checkbox"/> SAND (<2 mm) [6 pts]                  |           | <input type="checkbox"/> ARTIFICIAL [3 pts]             |           |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 50 (A) 25 (B) 4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points

Substrate Max = 40

29

A + B

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                             |                                                            |
|-------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts]          | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]            | <input type="checkbox"/> < 5 cm [5 pts]                    |
| <input checked="" type="checkbox"/> > 10 - 22.5 cm [25 pts] | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS NO FLOW - ISOLATED POOLS MAXIMUM POOL DEPTH (centimeters): 15cm

Pool Depth Max = 30

25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                                |                                                                     |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                         | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]              | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts] |                                                                     |

COMMENTS \_\_\_\_\_ AVERAGE BANKFULL WIDTH (meters) 2.1

Bankfull Width Max=30

20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN ZONE WIDTH (Per Bank)      |                                     | FLOODPLAIN QUALITY                  |                                     |                          |                          |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| L                                   | R                                   | L                                   | R                                   | L                        | R                        |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |

COMMENTS \_\_\_\_\_

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

|                                                                             |                                                                                           |
|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Stream Flowing                                     | <input checked="" type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent) |
| <input type="checkbox"/> Subsurface flow with isolated pools (Interstitial) | <input type="checkbox"/> Dry channel, no water (Ephemeral)                                |

COMMENTS \_\_\_\_\_

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

|                               |                              |                              |                                         |
|-------------------------------|------------------------------|------------------------------|-----------------------------------------|
| <input type="checkbox"/> None | <input type="checkbox"/> 1.0 | <input type="checkbox"/> 2.0 | <input checked="" type="checkbox"/> 3.0 |
| <input type="checkbox"/> 0.5  | <input type="checkbox"/> 1.5 | <input type="checkbox"/> 2.5 | <input type="checkbox"/> >3             |

STREAM GRADIENT ESTIMATE

Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score 51.5 (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

WWH Name: FRENCH CREEK Distance from Evaluated Stream 2.15 miles  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH NRCS Soil Map Page: 12 NRCS Soil Map Stream Order \_\_\_\_\_  
 County: LORAIN Township / City: AVON

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: 8/19 Quantity: \_\_\_\_\_  
 Photograph Information: \_\_\_\_\_  
 Elevated Turbidity? (Y/N): N Canopy (% open): 40%  
 Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_  
 Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_  
 Is the sampling reach representative of the stream (Y/N) Y If not, please explain: \_\_\_\_\_

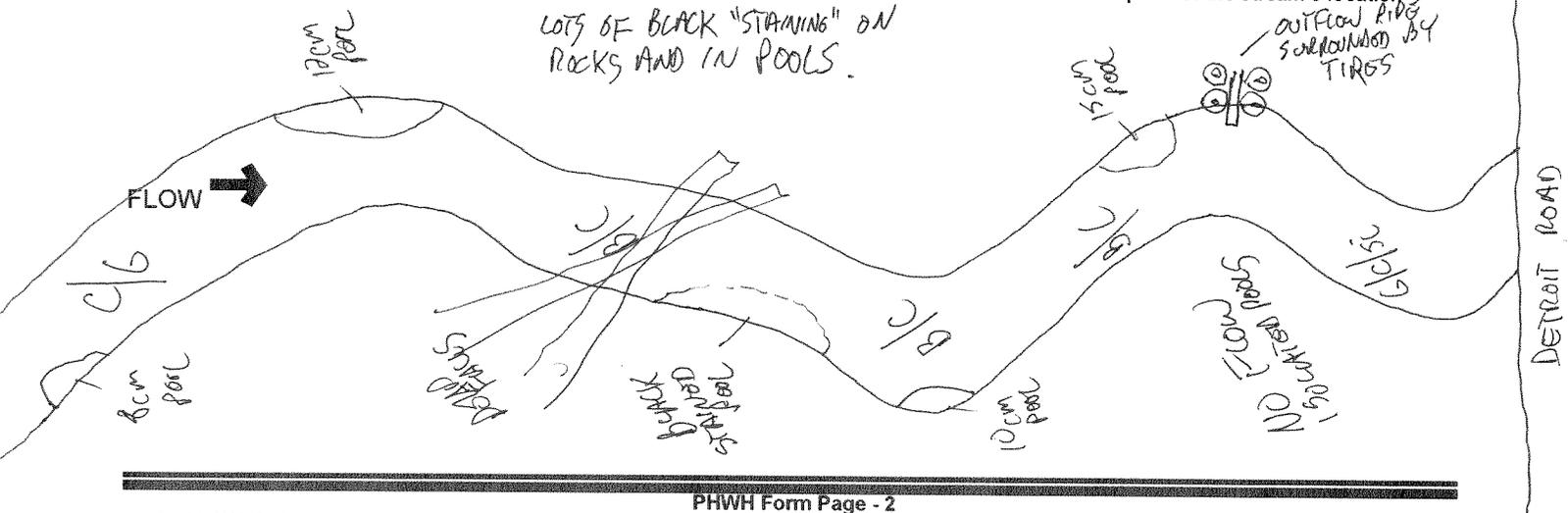
Additional comments/description of pollution impacts: OUTFLOW PIPE (PRESUMED SEPTIC); TIRES AND ASSORTED GARBAGE LINE <sup>SOUTH</sup> RIGHT BANKS; ROCKS HAVE BLACK STAINING (AGAIN, PRESUMED FROM SEWAGE FLOW)

**BIOTIC EVALUATION**

Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)  
 Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
 Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
 Comments Regarding Biology: NO AQUATIC LIFE NOTED IN REACH

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



**AVINS DITCH NOTES**

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Avins Ditch 0.0  
Stream Segment Location: Mouth of Ditch (French Creek RM 4.0)  
QHEI Score: NA HHEI Score: 31

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**FIELD NOTES:**

This section of Avins Ditch includes the stretch from the mouth at French Creek to Colorado Ave. in Avon. The entire stretch is a concrete channel with a thin deposit of silt and muck. The banks contain riprap. The channel supported an emergent community dominated by cattails, purple loosestrife, and soft-stemmed bulrush. A narrow 10-Foot vegetated buffer separates the creek channel from the maintained residential lawn on the northwest bank. Vegetation in this buffer includes eastern cottonwood and green ash saplings. There was no flow (<1cm.). The southeast bank is disturbed (old field) and appears to be proposed for development.

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**PHOTOS:**



1) Avins Ditch 0.0 – Facing downstream from road



2) Avins Ditch 0.0 – Mouth of ditch, facing upstream from French Creek



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

31

SITE NAME/LOCATION AVINS DITCH AT MOUTH (NEAR COLORADO AVE) - FRENCH CREEK RM 4.0

SITE NUMBER \_\_\_\_\_ RIVER BASIN \_\_\_\_\_ DRAINAGE AREA (mi<sup>2</sup>) 0.4

LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 0.0

DATE 21 AUG 02 SCORER JAY MILLER COMMENTS \_\_\_\_\_

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PHWH Streams" for Instructions

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY

MODIFICATIONS:

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                 | PERCENT | TYPE                                                    | PERCENT   |
|------------------------------------------------------|---------|---------------------------------------------------------|-----------|
| <input type="checkbox"/> BLDR SLABS [16 pts]         | _____   | <input type="checkbox"/> SILT [3 pt]                    | <u>5</u>  |
| <input type="checkbox"/> BOULDER (>256 mm) [16 pts]  | _____   | <input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts] | _____     |
| <input type="checkbox"/> BEDROCK [16 pt]             | _____   | <input type="checkbox"/> FINE DETRITUS [3 pts]          | _____     |
| <input type="checkbox"/> COBBLE (65-256 mm) [12 pts] | _____   | <input type="checkbox"/> CLAY or HARDPAN [0 pt]         | _____     |
| <input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]    | _____   | <input type="checkbox"/> MUCK [0 pts]                   | <u>5</u>  |
| <input type="checkbox"/> SAND (<2 mm) [6 pts]        | _____   | <input checked="" type="checkbox"/> ARTIFICIAL [3 pts]  | <u>90</u> |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 0 (A) 3 (B) 3

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: TOTAL NUMBER OF SUBSTRATE TYPES:

**HHEI Metric Points**

Substrate Max = 40

6

A + B

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                    |                                                            |
|----------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts] | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]   | <input checked="" type="checkbox"/> < 5 cm [5 pts]         |
| <input type="checkbox"/> > 10 - 22.5 cm [25 pts]   | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS CONCRETE CHANNEL MAXIMUM POOL DEPTH (centimeters): 2

Pool Depth Max = 30

5

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                                |                                                                     |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                         | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input checked="" type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]   | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts] |                                                                     |

COMMENTS \_\_\_\_\_ AVERAGE BANKFULL WIDTH (meters) 2

Bankfull Width Max=30

20

This information must also be completed RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                                 |                                                                  | FLOODPLAIN QUALITY                  |                        |
|------------------------------------------------|------------------------------------------------------------------|-------------------------------------|------------------------|
| L R (Per Bank)                                 | L R (Most Predominant per Bank)                                  | L R                                 |                        |
| <input type="checkbox"/> Wide >10m             | <input type="checkbox"/> Mature Forest, Wetland                  | <input type="checkbox"/>            | Conservation Tillage   |
| <input type="checkbox"/> Moderate 5-10m        | <input type="checkbox"/> Immature Forest, Shrub or Old Field     | <input type="checkbox"/>            | Urban or Industrial    |
| <input checked="" type="checkbox"/> Narrow <5m | <input checked="" type="checkbox"/> Residential, Park, New Field | <input type="checkbox"/>            | Open Pasture, Row Crop |
| <input type="checkbox"/> None                  | <input type="checkbox"/> Fenced Pasture                          | <input checked="" type="checkbox"/> | Mining or Construction |

COMMENTS RESIDENTIAL ON RIGHT, CONSTRUCTION SITE ON LEFT

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

Stream Flowing  Moist Channel, isolated pools, no flow (Intermittent)

Subsurface flow with isolated pools (Interstitial)  Dry channel, no water (Ephemeral)

COMMENTS \_\_\_\_\_

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

None  1.0  2.0  3.0

0.5  1.5  2.5  >3

STREAM GRADIENT ESTIMATE

Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score \_\_\_\_\_ (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

WWH Name: FRENCH CROOK Distance from Evaluated Stream 0.0  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH NRCS Soil Map Page: 7 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LORAIN Township / City: AVON

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: 8/19 Quantity: \_\_\_\_\_

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): N Canopy (% open): 75

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_

Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_

Is the sampling reach representative of the stream (Y/N) N If not, please explain: THIS PORTION OF THE CROOK HAS A CONCRETE CHANNEL

Additional comments/description of pollution impacts: ADJACENT TO RESIDENCE, CONSTRUCTION SITE AND A LARGE TRUCK STOP.

**BIOTIC EVALUATION**

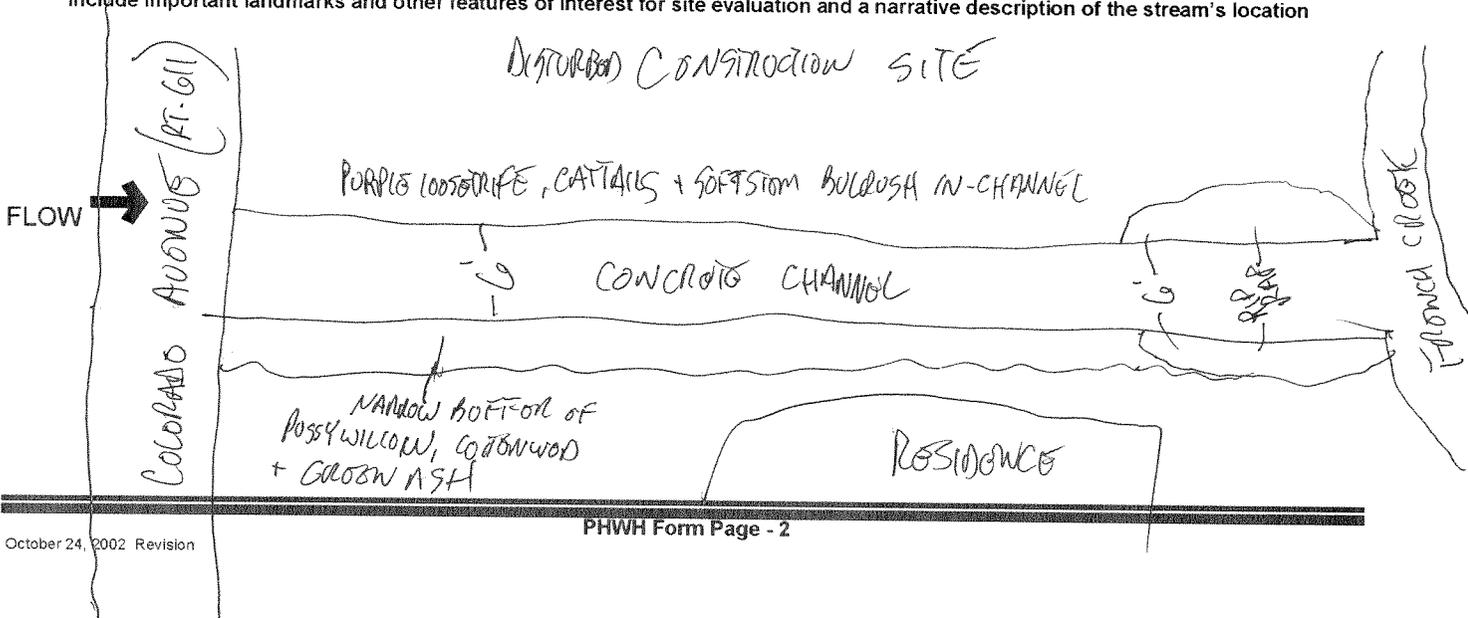
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_

Comments Regarding Biology: NO AQUATIC LIFE NOTED

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Avins Ditch 0.47  
Stream Segment Location: At Chester Industrial Parkway  
QHEI Score: NA HHEI Score: 27

---

FIELD NOTES: 21 AUG 2002

This stretch of Avins Ditch is located on the east side of Chester Industrial Parkway. The ditch has been channelized and dredged, apparently in association with the construction of the industrial park. The ditch had a moist surface, but no flow. Two 60" culverts carry the water under the road. The banks contain riprap and narrow buffers. Industrial development is located on both sides with maintained lawns. The north bank has a 15-20' wide buffer containing gray-stemmed dogwood, staghorn sumac, and pin oak. The south bank is mostly lawn and disturbed old-field. The channel (10'+/- wide) is vegetated with emergent species including cattails, purple loosestrife, bladder sedge and soft-stem bulrush. There is little opportunity for restoration.

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PHOTOS:



1) Avins Ditch 0.47 – Facing upstream from Chester Parkway



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

27

SITE NAME/LOCATION AVINS DITCH AT CHESTER INDUSTRIAL PARKWAY  
 SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 0.3  
 LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 0.47  
 DATE 8/21/02 SCORER SAY MILLER COMMENTS ADJACENT TO SMALL RETENTION POND

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL MODIFICATIONS:  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                                          | PERCENT | TYPE                                                                             | PERCENT |
|-------------------------------------------------------------------------------|---------|----------------------------------------------------------------------------------|---------|
| <input type="checkbox"/> <input type="checkbox"/> BLDR SLABS [16 pts]         | _____   | <input checked="" type="checkbox"/> <input type="checkbox"/> SILT [3 pt]         | 40      |
| <input type="checkbox"/> <input type="checkbox"/> BOULDER (>256 mm) [16 pts]  | _____   | <input type="checkbox"/> <input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts] | _____   |
| <input type="checkbox"/> <input type="checkbox"/> BEDROCK [16 pt]             | _____   | <input type="checkbox"/> <input type="checkbox"/> FINE DETRITUS [3 pts]          | _____   |
| <input type="checkbox"/> <input type="checkbox"/> COBBLE (65-256 mm) [12 pts] | _____   | <input type="checkbox"/> <input type="checkbox"/> CLAY or HARDPAN [0 pt]         | 10      |
| <input type="checkbox"/> <input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]    | _____   | <input type="checkbox"/> <input checked="" type="checkbox"/> MUCK [0 pts]        | 40      |
| <input type="checkbox"/> <input type="checkbox"/> SAND (<2 mm) [6 pts]        | 10      | <input type="checkbox"/> <input type="checkbox"/> ARTIFICIAL [3 pts]             | _____   |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 0 (A) 3 (B) 4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points

Substrate Max = 40

7

A + B

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                    |                                                                       |
|----------------------------------------------------|-----------------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts] | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]                      |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]   | <input type="checkbox"/> < 5 cm [5 pts]                               |
| <input type="checkbox"/> > 10 - 22.5 cm [25 pts]   | <input checked="" type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS DRY/MOIST CHANNEL - NO STANDING WATER MAXIMUM POOL DEPTH (centimeters): 0

Pool Depth Max = 30

0

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                                |                                                                     |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                         | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]              | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts] |                                                                     |

COMMENTS \_\_\_\_\_ AVERAGE BANKFULL WIDTH (meters) 2.7

Bankfull Width Max=30

20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                                               |                | FLOODPLAIN QUALITY                                           |                                     |
|--------------------------------------------------------------|----------------|--------------------------------------------------------------|-------------------------------------|
| L/R                                                          | (Per Bank)     | L R                                                          | (Most Predominant per Bank)         |
| <input checked="" type="checkbox"/> <input type="checkbox"/> | Wide >10m      | <input type="checkbox"/> <input type="checkbox"/>            | Mature Forest, Wetland              |
| <input type="checkbox"/> <input type="checkbox"/>            | Moderate 5-10m | <input type="checkbox"/> <input type="checkbox"/>            | Immature Forest, Shrub or Old Field |
| <input type="checkbox"/> <input checked="" type="checkbox"/> | Narrow <5m     | <input checked="" type="checkbox"/> <input type="checkbox"/> | Residential, Park, New Field        |
| <input type="checkbox"/> <input type="checkbox"/>            | None           | <input type="checkbox"/> <input type="checkbox"/>            | Fenced Pasture                      |
|                                                              | COMMENTS _____ | L R                                                          | Conservation Tillage                |
|                                                              |                | <input type="checkbox"/> <input checked="" type="checkbox"/> | Urban or Industrial                 |
|                                                              |                | <input type="checkbox"/> <input type="checkbox"/>            | Open Pasture, Row Crop              |
|                                                              |                | <input type="checkbox"/> <input type="checkbox"/>            | Mining or Construction              |

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):  
 Stream Flowing  Moist Channel, isolated pools, no flow (Intermittent)  
 Subsurface flow with isolated pools (Interstitial)  Dry channel, no water (Ephemeral)

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):  
 None  1.0  2.0  3.0  
 0.5  1.5  2.5  >3

STREAM GRADIENT ESTIMATE  Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score \_\_\_\_\_ (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

WWH Name: FRENCH CREEK Distance from Evaluated Stream 0.47mi  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH NRCS Soil Map Page: 7 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LOBAIN Township / City: AVON

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: 8/19 Quantity: \_\_\_\_\_

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): NA Canopy (% open): 70%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_

Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_

Is the sampling reach representative of the stream (Y/N) Y If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: RUNS THROUGH INDUSTRIAL PARK, GOES THROUGH CULVERTS; LITTLE OR NON-VALUABLE BUFFERS

**BIOTIC EVALUATION**

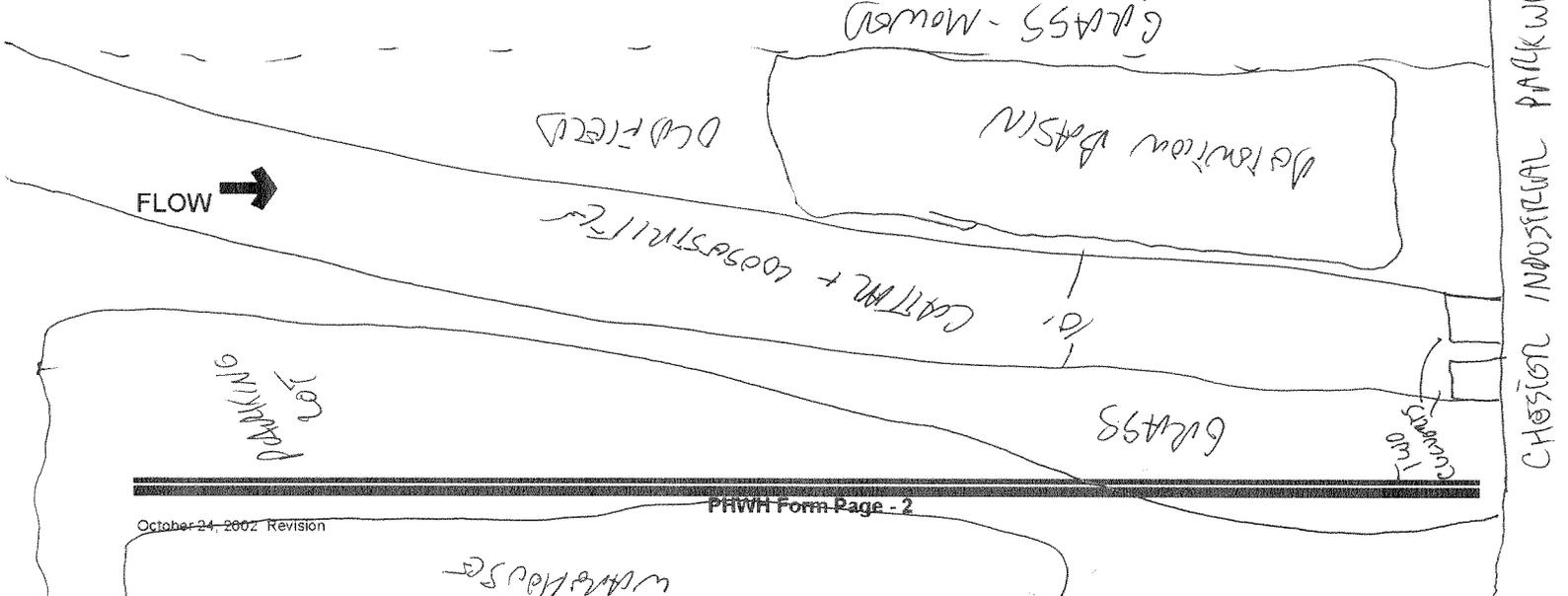
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_

Comments Regarding Biology: COMPLETELY VEGETATED CHANNEL - MOIST BUT NO STANDING AND/OR FLOWING WATER

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



**SCHWARTZ DITCH NOTES**

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Schwartz Ditch 0.0  
Stream Segment Location: Mouth of Ditch at Jaycox Road (RM FC-8.9)  
QHEI Score: 29 HHEI Score: NA

---

**FIELD NOTES:**

This portion of Schwartz Ditch includes the mouth upstream (under Jaycox Road). The ditch water quality appears to be low. This straight, channelized portion is 10' wide and 30-50 cm deep. A 20'+/- wide buffer separates it from the adjoining residential development on either side. Dominant species in the riparian area include: silver maple, boxelder, pussy willow, reed canary grass, green ash, eastern cottonwood, quaking aspen and American basswood. The substrate is dominated by silt and muck with lesser amounts of gravel, sand and detritus. Although water quality is low, no sources of pollution were noted. Frogs and macroinvertebrates were noted. The height of the culvert at Jaycox Road and presence of extraneous stones adjacent to the box culvert appears to have a damming effect that raises water levels upstream.

---

**PHOTOS:**



1) Schwartz Ditch 0.0 – Mouth of ditch facing upstream



2) Schwartz Ditch 0.0 – Facing downstream towards mouth of ditch



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

29

River Code: RM: 0.0 Stream: SCHWARTZ DITCH
Date: 9/10/02 Location: AT MOUTH (NEAR SAYCOO ROAD) - FRENCH CREEK RM 8.9
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
-BLDR /SLBS [10] -GRAVEL [7] 5 Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)
-BOULDER [9] -SAND [6] 5 -LIMESTONE [1] SILT:
-COBBLE [8] -BEDROCK [5] -TILLS [1] -SILT HEAVY [-2]
-HARDPAN [4] -DETRITUS [3] 20 -WETLANDS [0] -SILT MODERATE [-1]
-MUCK [2] 40 -ARTIFICIAL [0] -HARDPAN [0] -SILT NORMAL [0]
-SILT [2] 30 NOTE: Ignore Sludge Originating From Point Sources -SANDSTONE [0] EMBEDDED -SILT FREE [1]
-RIP/RAP [0] NESS: -EXTENSIVE [-2]
-LACUSTRINE [0] -MODERATE [-1]
-SHALE [-1] -NONE [1]
-COAL FINES [-2]

Substrate
0
Max 20

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

TYPE: Score All That Occur
UNDERCUT BANKS [1] 2 POOLS > 70 cm [2] 0
OVERHANGING VEGETATION [1] 2 ROOTWADS [1] 0
SHALLOWS (IN SLOW WATER) [1] 2 BOULDERS [1] 0
ROOTMATS [1] 1 COMMENTS:

AMOUNT: (Check ONLY One or check 2 and AVERAGE)
- EXTENSIVE > 75% [11]
- MODERATE 25-75% [7]
- SPARSE 5-25% [3]
- NEARLY ABSENT < 5% [1]

Cover
9
Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
- HIGH [4] - EXCELLENT [7] - NONE [6] - HIGH [3] - SNAGGING - IMPOUND.
- MODERATE [3] - GOOD [5] - RECOVERED [4] - MODERATE [2] - RELOCATION - ISLANDS
- LOW [2] - FAIR [3] - RECOVERING [3] - LOW [1] - CANOPY REMOVAL - LEVEED
- NONE [1] - POOR [1] - RECENT OR NO RECOVERY [1] - DREDGING - BANK SHAPING
- ONE SIDE CHANNEL MODIFICATIONS

Channel
5
Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)
- WIDE > 50m [4] - FOREST, SWAMP [3] - CONSERVATION TILLAGE [1] - NONE/LITTLE [3]
- MODERATE 10-50m [3] - SHRUB OR OLD FIELD [2] - URBAN OR INDUSTRIAL [0] - MODERATE [2]
- NARROW 5-10 m [2] - RESIDENTIAL, PARK, NEW FIELD [1] - OPEN PASTURE, ROWCROP [0] - HEAVY/SEVERE [1]
- VERY NARROW < 5 m [1] - FENCED PASTURE [1] - MINING/CONSTRUCTION [0]

Riparian
4
Max 10

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH MORPHOLOGY CURRENT VELOCITY (POOLS & RIFFLES!)
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)
- > 1m [6] - POOL WIDTH > RIFFLE WIDTH [2] - EDDIES [1] - TORRENTIAL [-1]
- 0.7-1m [4] - POOL WIDTH = RIFFLE WIDTH [1] - FAST [1] - INTERSTITIAL [-1]
- 0.4-0.7m [2] - POOL WIDTH < RIFFLE W. [0] - MODERATE [1] - INTERMITTENT [-2]
- 0.2-0.4m [1] - SLOW [1] - VERY FAST [1]
- < 0.2m [POOL=0] COMMENTS:

Pool/Current
5
Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS
- Best Areas > 10 cm [2] - MAX > 50 [2] - STABLE (e.g., Cobble, Boulder) [2] - NONE [2]
- Best Areas 5-10 cm [1] - MAX < 50 [1] - MOD. STABLE (e.g., Large Gravel) [1] - LOW [1]
- Best Areas < 5 cm [RIFFLE=0] - UNSTABLE (Fine Gravel, Sand) [0] - MODERATE [0]
- EXTENSIVE [-1]

Riffle/Run
0
Max 8

COMMENTS: - NO RIFFLE [Metric=0]

Gradient
6
Max 10

6) GRADIENT (ft/mi): 10 DRAINAGE AREA (sq.mi.): 4.1
%POOL: %GLIDE: 100
%RIFFLE: %RUN:

\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

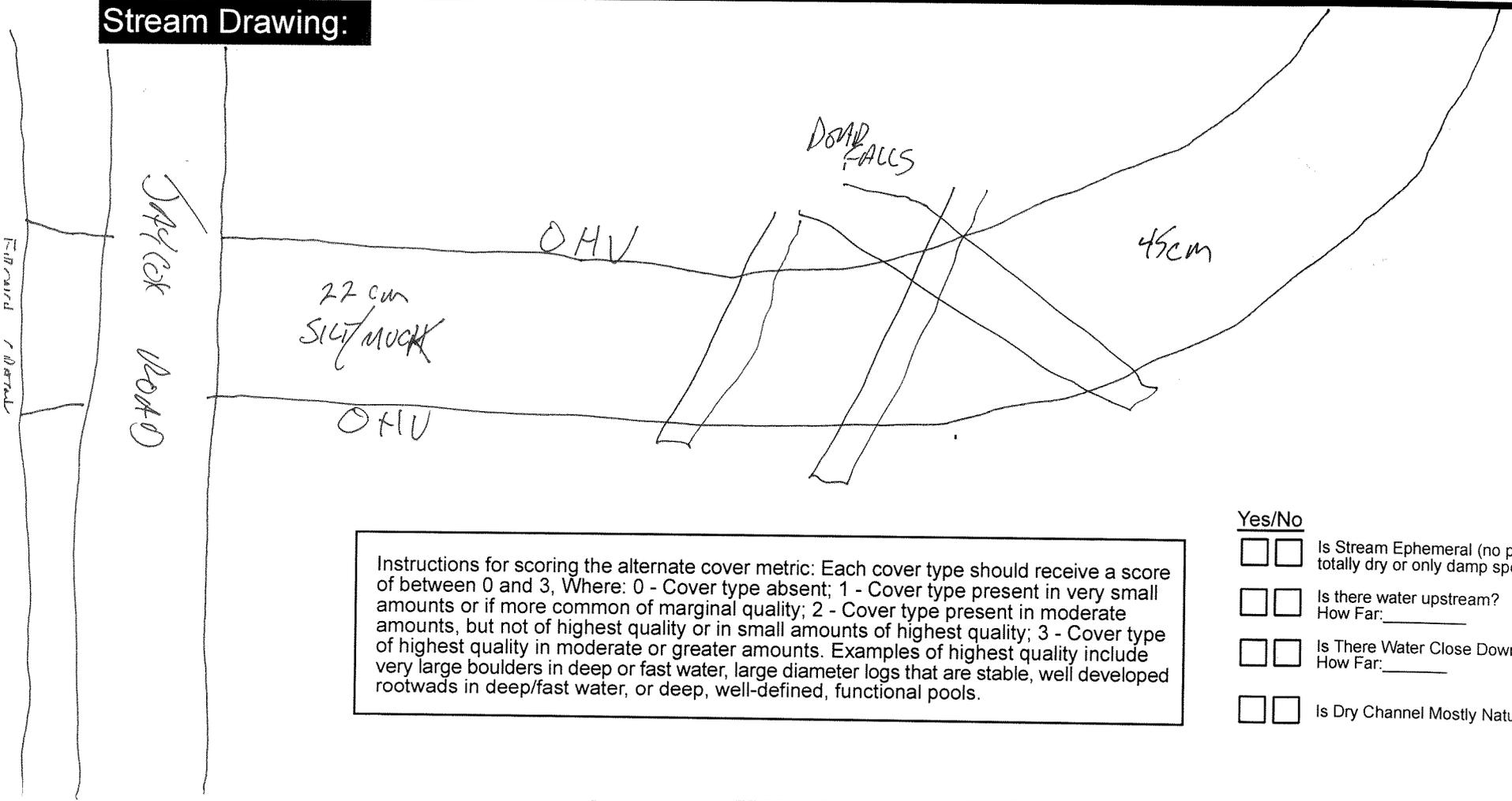
Gradient:

- Low,  - Moderate,  - High

|                     |           |                |              |                |
|---------------------|-----------|----------------|--------------|----------------|
| Gear:               | Distance: | Water Clarity: | Water Stage: | Canopy -% Open |
| First Sampling Pass | _____     | _____          | _____        | _____          |

| Stream Measurements: |               |               |                    |                |                |                    |                 |                 |  |
|----------------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|--|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio |  |
|                      |               |               |                    |                |                |                    |                 |                 |  |

### Stream Drawing:



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Schwartz Ditch 0.3

Stream Segment Location: At Schwartz Park

QHEI Score: 35

HHEI Score: NA

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FIELD NOTES: 10 SEP 2002

This stretch of Schwartz Ditch is located behind Schwartz Road Park. Macroinvertebrates, including crayfish, as well as frogs and minnows were noted. The substrate is mostly clay and silt. The incised ditch is 10' +/- wide and 20 cm +/- deep. A narrow riparian buffer is located on the north side, separating the ditch from the ball fields in the park. A wide (100'+) buffer was noted to the south. The forested buffer is dominated by American elm, green ash, northern arrowwood, silky dogwood, gray-stemmed dogwood, multiflora rose and boxelder.

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PHOTOS:



1) Schwartz Ditch 0.3 – Facing upstream at Schwartz Park site



2) Schwartz Ditch 0.3 – Facing downstream at Schwartz Park site



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **35**

River Code: RM: D.3 Stream: SCHWARTZ DITCH  
 Date: 9/10/02 Location: WITHIN SCHWARTZ ROAD PARK - NEAR FOOTBRIDGE  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

|                                                                      |                                                         |                                                          |                                                        |                                                      |
|----------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|------------------------------------------------------|
| TYPE                                                                 | POOL RIFFLE                                             | POOL RIFFLE                                              | SUBSTRATE ORIGIN                                       | SUBSTRATE QUALITY                                    |
| <input type="checkbox"/> -BLDR /SLBS[10] _____                       | <input type="checkbox"/> -GRAVEL [7] <u>5</u> <u>15</u> | Check ONE (OR 2 & AVERAGE)                               |                                                        | Check ONE (OR 2 & AVERAGE)                           |
| <input type="checkbox"/> -BOULDER [9] _____                          | <input type="checkbox"/> -SAND [6] <u>5</u> <u>5</u>    | <input type="checkbox"/> -LIMESTONE [1] _____            | SILT:                                                  | <input checked="" type="checkbox"/> -SILT HEAVY [-2] |
| <input type="checkbox"/> -COBBLE [8] <u>5</u> <u>15</u>              | <input type="checkbox"/> -BEDROCK[5] _____              | <input checked="" type="checkbox"/> -TILLS [1] _____     | <input type="checkbox"/> -WETLANDS[0] _____            | <input type="checkbox"/> -SILT MODERATE [-1]         |
| <input checked="" type="checkbox"/> -HARDPAN [4] <u>40</u> <u>30</u> | <input type="checkbox"/> -DETRITUS[3] _____             | <input type="checkbox"/> -WETLANDS[0] _____              | <input checked="" type="checkbox"/> -HARDPAN [0] _____ | <input type="checkbox"/> -SILT NORMAL [0]            |
| <input type="checkbox"/> -MUCK [2] _____                             | <input type="checkbox"/> -ARTIFICIAL[0] _____           | <input checked="" type="checkbox"/> -SANDSTONE [0] _____ | EMBEDDED                                               | <input type="checkbox"/> -SILT FREE [1]              |
| <input checked="" type="checkbox"/> -SILT [2] <u>45</u> <u>35</u>    | NOTE: Ignore Sludge Originating From Point Sources      | <input type="checkbox"/> -RIP/RAP [0] _____              | NESS:                                                  | <input checked="" type="checkbox"/> -EXTENSIVE [-2]  |
| NUMBER OF SUBSTRATE TYPES: <u>4 or More</u> [2]                      |                                                         | <input type="checkbox"/> -LACUSTRINE [0] _____           | <input type="checkbox"/> -SHALE [-1] _____             | <input type="checkbox"/> -MODERATE [-1]              |
| High Quality Only, Score 5 or >                                      |                                                         | <input type="checkbox"/> -3 or Less [0] _____            | <input type="checkbox"/> -COAL FINES [-2] _____        | <input type="checkbox"/> -NORMAL [0]                 |
| COMMENTS: _____                                                      |                                                         |                                                          |                                                        | <input type="checkbox"/> -NONE [1]                   |

Substrate  
**4 1/2**  
Max 20

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

|                                       |                            |                                                  |
|---------------------------------------|----------------------------|--------------------------------------------------|
| (Structure)                           | TYPE: Score All That Occur | AMOUNT: (Check ONLY One or check 2 and AVERAGE)  |
| <u>0</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <input type="checkbox"/> - EXTENSIVE > 75% [11]  |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <input type="checkbox"/> - MODERATE 25-75% [7]   |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>1</u> BOULDERS [1]      | <input type="checkbox"/> - SPARSE 5-25% [3]      |
| <u>2</u> ROOTMATS [1]                 | COMMENTS: _____            | <input type="checkbox"/> - NEARLY ABSENT < 5%[1] |
|                                       |                            |                                                  |

Cover  
**9**  
Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

|                                               |                                                |                                                      |                                               |                                                                      |
|-----------------------------------------------|------------------------------------------------|------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------|
| SINUOSITY                                     | DEVELOPMENT                                    | CHANNELIZATION                                       | STABILITY                                     | MODIFICATIONS/OTHER                                                  |
| <input type="checkbox"/> - HIGH [4]           | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                  | <input type="checkbox"/> - HIGH [3]           | <input type="checkbox"/> - SNAGGING                                  |
| <input type="checkbox"/> - MODERATE [3]       | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]             | <input type="checkbox"/> - MODERATE [2]       | <input checked="" type="checkbox"/> - RELOCATION                     |
| <input checked="" type="checkbox"/> - LOW [2] | <input type="checkbox"/> - FAIR [3]            | <input checked="" type="checkbox"/> - RECOVERING [3] | <input checked="" type="checkbox"/> - LOW [1] | <input type="checkbox"/> - CANOPY REMOVAL                            |
| <input type="checkbox"/> - NONE [1]           | <input checked="" type="checkbox"/> - POOR [1] | <input type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                               | <input type="checkbox"/> - LEVEED                                    |
|                                               |                                                |                                                      |                                               | <input type="checkbox"/> - DREDGING                                  |
|                                               |                                                |                                                      |                                               | <input checked="" type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS |

Channel  
**7**  
Max 20

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

|                                                           |                                                                     |                                                   |
|-----------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------|
| RIPARIAN WIDTH                                            | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)                       | BANK EROSION                                      |
| L R (Per Bank)                                            | L R (Most Predominant Per Bank)                                     | L R (Per Bank)                                    |
| <input checked="" type="checkbox"/> - WIDE > 50m [4]      | <input checked="" type="checkbox"/> -FOREST, SWAMP [3]              | <input type="checkbox"/> -NONE/LITTLE [3]         |
| <input type="checkbox"/> - MODERATE 10-50m [3]            | <input type="checkbox"/> -SHRUB OR OLD FIELD [2]                    | <input checked="" type="checkbox"/> -MODERATE [2] |
| <input type="checkbox"/> - NARROW 5-10 m [2]              | <input checked="" type="checkbox"/> -RESIDENTIAL,PARK,NEW FIELD [1] | <input type="checkbox"/> -HEAVY/SEVERE[1]         |
| <input checked="" type="checkbox"/> - VERY NARROW <5 m[1] | <input type="checkbox"/> -FENCED PASTURE [1]                        |                                                   |
| <input type="checkbox"/> - NONE [0]                       |                                                                     |                                                   |

Riparian  
**6 1/2**  
Max 10

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

|                                                     |                                                                    |                                               |
|-----------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------|
| MAX. DEPTH (Check 1 ONLY!)                          | MORPHOLOGY (Check 1 or 2 & AVERAGE)                                | CURRENT VELOCITY (Check All That Apply)       |
| <input type="checkbox"/> - >1m [6]                  | <input type="checkbox"/> -POOL WIDTH > RIFFLE WIDTH [2]            | <input type="checkbox"/> -EDDIES[1]           |
| <input type="checkbox"/> - 0.7-1m [4]               | <input checked="" type="checkbox"/> -POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> -FAST[1]             |
| <input type="checkbox"/> - 0.4-0.7m [2]             | <input type="checkbox"/> -POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> -MODERATE [1]        |
| <input checked="" type="checkbox"/> - 0.2- 0.4m [1] | COMMENTS: _____                                                    | <input checked="" type="checkbox"/> -SLOW [1] |
| <input type="checkbox"/> - < 0.2m [POOL=0]          |                                                                    | <input type="checkbox"/> -TORRENTIAL[-1]      |
|                                                     |                                                                    | <input type="checkbox"/> -INTERSTITIAL[-1]    |
|                                                     |                                                                    | <input type="checkbox"/> -INTERMITTENT[-2]    |
|                                                     |                                                                    | <input type="checkbox"/> -VERY FAST[1]        |

Pool/Current  
**3**  
Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

|                                                             |                                                   |                                                                      |                                                      |
|-------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------|------------------------------------------------------|
| RIFFLE DEPTH                                                | RUN DEPTH                                         | RIFFLE/RUN SUBSTRATE                                                 | RIFFLE/RUN EMBEDDEDNESS                              |
| <input type="checkbox"/> - Best Areas >10 cm [2]            | <input type="checkbox"/> - MAX > 50 [2]           | <input type="checkbox"/> -STABLE (e.g.,Cobble, Boulder) [2]          | <input type="checkbox"/> - NONE [2]                  |
| <input checked="" type="checkbox"/> - Best Areas 5-10 cm[1] | <input checked="" type="checkbox"/> - MAX < 50[1] | <input type="checkbox"/> -MOD. STABLE (e.g.,Large Gravel) [1]        | <input type="checkbox"/> - LOW [1]                   |
| <input type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0]     |                                                   | <input checked="" type="checkbox"/> -UNSTABLE (Fine Gravel,Sand) [0] | <input type="checkbox"/> - MODERATE [0]              |
| COMMENTS: _____                                             |                                                   | <input type="checkbox"/> - NO RIFFLE [Metric=0]                      | <input checked="" type="checkbox"/> - EXTENSIVE [-1] |

Riffle/Run  
**1**  
Max 8  
Gradient  
**4**  
Max 10

6) GRADIENT (ft/mi): 3.7 DRAINAGE AREA (sq.mi.): 3.9

|                    |                   |
|--------------------|-------------------|
| %POOL: <u>20</u>   | %GLIDE: <u>55</u> |
| %RIFFLE: <u>15</u> | %RUN: <u>10</u>   |



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Schwartz Ditch 0.52  
Stream Segment Location: At Sandy Lane  
QHEI Score: 40.5 HHEI Score: NA

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FIELD NOTES: 10 SEP 2002

This stretch of Schwartz Ditch is located upstream (east) of Sandy Lane. The wide (>100') buffers are dominated by a green ash/red maple forest. The 12' wide 10-25 cm. deep creek channel has a mostly hardpan and silt substrate with lesser amounts of gravel, sand and cobbles. Several (3-4) PVC discharges are coming from nearby homes. A containment boom was noted floating in the ditch.

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PHOTOS:



1) Schwartz Ditch 0.52 – Facing upstream from Sandy Lane Bridge



2) Schwartz Ditch 0.52 – Facing downstream towards bridge



# Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 40.5

River Code: RM: 0.52 Stream: SCHWARTZ DITCH  
 Date: 9/10/07 Location: AT SANDY CREEK  
 Scorers Full Name: SAY MILLON Affiliation: USACO - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

| TYPE                                                       | POOL RIFFLE                                        | POOL RIFFLE                                                 | SUBSTRATE ORIGIN                                 | SUBSTRATE QUALITY                                    |
|------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------------|--------------------------------------------------|------------------------------------------------------|
| <input type="checkbox"/> -BLDR /SLBS[10] _____             | <input type="checkbox"/> -GRAVEL [7] <u>10</u>     | Check ONE (OR 2 & AVERAGE)                                  |                                                  | Check ONE (OR 2 & AVERAGE)                           |
| <input type="checkbox"/> -BOULDER [9] _____                | <input type="checkbox"/> -SAND [6] <u>20</u>       | <input type="checkbox"/> -LIMESTONE [1] _____               | SILT:                                            | <input checked="" type="checkbox"/> -SILT HEAVY [-2] |
| <input type="checkbox"/> -COBBLE [8] <u>10</u>             | <input type="checkbox"/> -BEDROCK[5] _____         | <input type="checkbox"/> -TILLS [1] _____                   | <input type="checkbox"/> -WETLANDS[0]            | <input type="checkbox"/> -SILT MODERATE [-1]         |
| <input checked="" type="checkbox"/> -HARDPAN [4] <u>30</u> | <input type="checkbox"/> -DETRITUS[3] _____        | <input type="checkbox"/> -WETLANDS[0]                       | <input checked="" type="checkbox"/> -HARDPAN [0] | <input type="checkbox"/> -SILT NORMAL [0]            |
| <input type="checkbox"/> -MUCK [2] _____                   | <input type="checkbox"/> -ARTIFICIAL[0] _____      | <input checked="" type="checkbox"/> -SANDSTONE [0] EMBEDDED | NESS:                                            | <input type="checkbox"/> -SILT FREE [1]              |
| <input checked="" type="checkbox"/> -SILT [2] <u>30</u>    | NOTE: Ignore Sludge Originating From Point Sources | <input type="checkbox"/> -RIP/RAP [0] _____                 |                                                  | <input checked="" type="checkbox"/> -EXTENSIVE [-2]  |
|                                                            |                                                    | <input type="checkbox"/> -LACUSTRINE [0]                    |                                                  | <input type="checkbox"/> -MODERATE [-1]              |
|                                                            |                                                    | <input type="checkbox"/> -SHALE [-1]                        |                                                  | <input type="checkbox"/> -NORMAL [0]                 |
|                                                            |                                                    | <input type="checkbox"/> -COAL FINES [-2]                   |                                                  | <input type="checkbox"/> -NONE [1]                   |

NUMBER OF SUBSTRATE TYPES: 4 or More [2]  
 (High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS: \_\_\_\_\_

Substrate  
4  
 Max 20

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| (Structure)                           | TYPE: Score All That Occur | AMOUNT: (Check ONLY One or check 2 and AVERAGE)  |
|---------------------------------------|----------------------------|--------------------------------------------------|
| <u>1</u> UNDERCUT BANKS [1]           | <u>1</u> POOLS > 70 cm [2] | <input type="checkbox"/> - EXTENSIVE > 75% [11]  |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>1</u> ROOTWADS [1]      | <input type="checkbox"/> - MODERATE 25-75% [7]   |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>0</u> BOULDERS [1]      | <input type="checkbox"/> - SPARSE 5-25% [3]      |
| <u>2</u> ROOTMATS [1]                 | COMMENTS: _____            | <input type="checkbox"/> - NEARLY ABSENT < 5%[1] |

Cover  
11  
 Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                     | DEVELOPMENT                                    | CHANNELIZATION                                       | STABILITY                                     | MODIFICATIONS/OTHER                                                                |
|-----------------------------------------------|------------------------------------------------|------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------|
| <input type="checkbox"/> - HIGH [4]           | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                  | <input type="checkbox"/> - HIGH [3]           | <input type="checkbox"/> - SNAGGING <input type="checkbox"/> - IMPOUND.            |
| <input type="checkbox"/> - MODERATE [3]       | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]             | <input type="checkbox"/> - MODERATE [2]       | <input checked="" type="checkbox"/> -RELOCATION <input type="checkbox"/> - ISLANDS |
| <input checked="" type="checkbox"/> - LOW [2] | <input type="checkbox"/> - FAIR [3]            | <input checked="" type="checkbox"/> -RECOVERING [3]  | <input checked="" type="checkbox"/> - LOW [1] | <input type="checkbox"/> - CANOPY REMOVAL <input type="checkbox"/> - LEVEED        |
| <input type="checkbox"/> - NONE [1]           | <input checked="" type="checkbox"/> - POOR [1] | <input type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                               | <input type="checkbox"/> - DREDGING <input type="checkbox"/> - BANK SHAPING        |
|                                               |                                                |                                                      |                                               | <input checked="" type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS               |

COMMENTS: \_\_\_\_\_

Channel  
7  
 Max 20

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

| RIPARIAN WIDTH                                          | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)                          | BANK EROSION                                       |
|---------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------|
| L R (Per Bank)                                          | L R (Most Predominant Per Bank)                                        | L R (Per Bank)                                     |
| <input checked="" type="checkbox"/> - WIDE > 50m [4]    | <input checked="" type="checkbox"/> - FOREST, SWAMP [3]                | <input type="checkbox"/> - NONE/LITTLE [3]         |
| <input type="checkbox"/> - MODERATE 10-50m [3]          | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]                      | <input checked="" type="checkbox"/> - MODERATE [2] |
| <input checked="" type="checkbox"/> - NARROW 5-10 m [2] | <input checked="" type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> - HEAVY/SEVERE [1]        |
| <input type="checkbox"/> - VERY NARROW <5 m[1]          | <input type="checkbox"/> - FENCED PASTURE [1]                          |                                                    |
| <input type="checkbox"/> - NONE [0]                     |                                                                        |                                                    |

COMMENTS: \_\_\_\_\_

Riparian  
7 1/2  
 Max 10

5.) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                       | MORPHOLOGY (Check 1 or 2 & AVERAGE)                                 | CURRENT VELOCITY (Check All That Apply)                                                 |
|--------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| <input type="checkbox"/> - >1m [6]               | <input checked="" type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> - EDDIES [1] <input type="checkbox"/> - TORRENTIAL [-1]        |
| <input checked="" type="checkbox"/> - 0.7-1m [4] | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> - FAST [1] <input type="checkbox"/> - INTERSTITIAL [-1]        |
| <input type="checkbox"/> - 0.4-0.7m [2]          | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> - MODERATE [1] <input type="checkbox"/> - INTERMITTENT [-2]    |
| <input type="checkbox"/> - 0.2- 0.4m [1]         |                                                                     | <input checked="" type="checkbox"/> - SLOW [1] <input type="checkbox"/> - VERY FAST [1] |
| <input type="checkbox"/> - < 0.2m [POOL=0]       | COMMENTS: _____                                                     |                                                                                         |

Pool/Current  
7  
 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                            | RUN DEPTH                               | RIFFLE/RUN SUBSTRATE                                            | RIFFLE/RUN EMBEDDEDNESS                   |
|---------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|-------------------------------------------|
| <input type="checkbox"/> - Best Areas >10 cm [2]        | <input type="checkbox"/> - MAX > 50 [2] | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> - NONE [2]       |
| <input type="checkbox"/> - Best Areas 5-10 cm [1]       | <input type="checkbox"/> - MAX < 50 [1] | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> - LOW [1]        |
| <input type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0] |                                         | <input type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> - MODERATE [0]   |
| COMMENTS: _____                                         |                                         |                                                                 | <input type="checkbox"/> - EXTENSIVE [-1] |

- NO RIFFLE [Metric=0]

Riffle/Run  
0  
 Max 8

Gradient  
4  
 Max 10

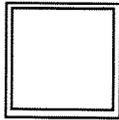
6) GRADIENT (ft/mi): 3.7 DRAINAGE AREA (sq.mi.): 3.8

|                                                                        |                                                                        |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| %POOL: <span style="border: 1px solid black; padding: 2px;">25</span>  | %GLIDE: <span style="border: 1px solid black; padding: 2px;">40</span> |
| %RIFFLE: <span style="border: 1px solid black; padding: 2px;">-</span> | %RUN: <span style="border: 1px solid black; padding: 2px;">35</span>   |

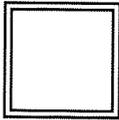
Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain: \_\_\_\_\_

Major Suspected Sources of Impacts (Check All That Apply):

- None
- Industrial
- WWTP
- Ag
- Livestock
- Silviculture
- Construction
- Urban Runoff
- CSOs
- Suburban Impacts
- Mining
- Channelization
- Riparian Removal
- Landfills
- Natural
- Dams
- Other Flow Alteration
- Other: \_\_\_\_\_



Subjective Rating (1-10)



Aesthetic Rating (1-10)

Gradient:

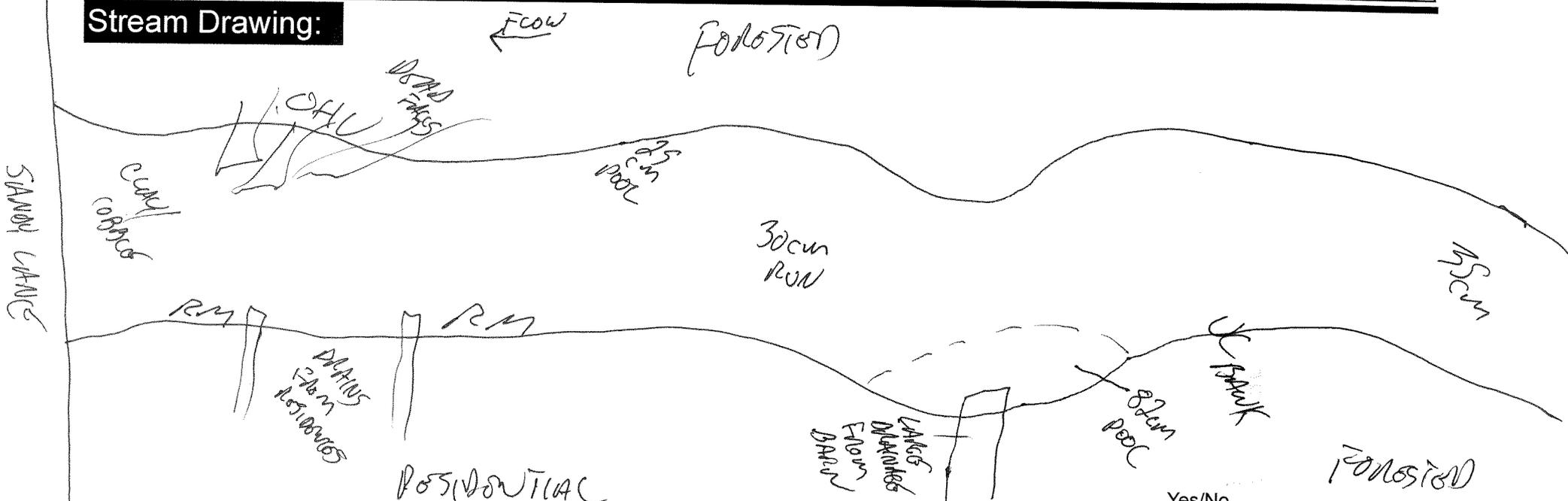
- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open: \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

| Stream Measurements: |               |               |                    |                     |           |                    |                 |                 |                 |
|----------------------|---------------|---------------|--------------------|---------------------|-----------|--------------------|-----------------|-----------------|-----------------|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Mean Depth | W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Width | Entrench. Ratio |
|                      |               |               |                    |                     |           |                    |                 |                 |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Schwartz Ditch 0.71  
Stream Segment Location: At Nagle Road  
QHEI Score: 21.5 HHEI Score: NA

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FIELD NOTES: 10 SEP 2002

This stretch of Schwartz Ditch is located upstream (east) of Nagle Road and is surrounded by new home construction. The Shaffer development [(440) 934-1119] is located to the south. The first 50' upstream of the bridge has been recently disturbed with some filling-in of the creek channel and a great potential for erosion (no silt curtains). This disturbance is the result of utility installations and the construction of a detention pond on the south side of the ditch. Several discharge pipes have been recently installed. Narrow vegetated buffers (5-10' wide) further upstream are dominated by hawthorn, green ash, gray-stemmed dogwood, silky dogwood, pin oak, red maple, and American basswood. A few macroinvertebrates as well as minnows and tadpoles were noted.

---

PHOTOS:



1) Schwartz Ditch 0.71 - Facing upstream from Nagle Road



2) Schwartz Ditch 0.71 – Facing downstream from end of sample



3) Schwartz Ditch 0.71 – Facing southeast along Nagle Road

River Code: RM: 0.71 Stream: SCHWARTZ DITCH  
 Date: 9/10/02 Location: AT NAGEL ROAD  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                                          | POOL RIFFLE | POOL RIFFLE                                        | SUBSTRATE ORIGIN                                 | SUBSTRATE QUALITY                                          |
|---------------------------------------------------------------|-------------|----------------------------------------------------|--------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> -BLDR /SLBS [10]                     |             | <input type="checkbox"/> -GRAVEL [7]               | Check ONE (OR 2 & AVERAGE)                       |                                                            |
| <input type="checkbox"/> -BOULDER [9] <u>5 5</u>              |             | <input type="checkbox"/> -SAND [6] <u>10 10</u>    | <input type="checkbox"/> -LIMESTONE [1]          | SILT: <input checked="" type="checkbox"/> -SILT HEAVY [-2] |
| <input type="checkbox"/> -COBBLE [8] <u>5 5</u>               |             | <input type="checkbox"/> -BEDROCK [5]              | <input type="checkbox"/> -TILLS [1]              | <input type="checkbox"/> -SILT MODERATE [-1]               |
| <input checked="" type="checkbox"/> -HARDPAN [4] <u>30 30</u> |             | <input type="checkbox"/> -DETRITUS [3]             | <input type="checkbox"/> -WETLANDS [0]           | <input type="checkbox"/> -SILT NORMAL [0]                  |
| <input type="checkbox"/> -MUCK [2]                            |             | <input type="checkbox"/> -ARTIFICIAL [0]           | <input checked="" type="checkbox"/> -HARDPAN [0] | <input type="checkbox"/> -SILT FREE [1]                    |
| <input checked="" type="checkbox"/> -SILT [2] <u>50 50</u>    |             | NOTE: Ignore Sludge Originating From Point Sources |                                                  | <input checked="" type="checkbox"/> -EXTENSIVE [-2]        |
|                                                               |             |                                                    | <input type="checkbox"/> -SANDSTONE [0] EMBEDDED | <input type="checkbox"/> -MODERATE [-1]                    |
|                                                               |             |                                                    | <input type="checkbox"/> -RIP/RAP [0] NESS:      | <input type="checkbox"/> -NORMAL [0]                       |
|                                                               |             |                                                    | <input type="checkbox"/> -LACUSTRINE [0]         | <input type="checkbox"/> -NONE [1]                         |
|                                                               |             |                                                    | <input type="checkbox"/> -SHALE [-1]             |                                                            |
|                                                               |             |                                                    | <input type="checkbox"/> -COAL FINES [-2]        |                                                            |

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  3 or Less [0]

COMMENTS: \_\_\_\_\_

Substrate  
2  
 Max 20

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)  
 (Structure) TYPE: Score All That Occur

|                                       |                            |                                   |                                                   |
|---------------------------------------|----------------------------|-----------------------------------|---------------------------------------------------|
| <u>0</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <u>0</u> OXBOWS, BACKWATERS [1]   | AMOUNT: (Check ONLY One or check 2 and AVERAGE)   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <u>0</u> AQUATIC MACROPHYTES [1]  | <input type="checkbox"/> - EXTENSIVE > 75% [11]   |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>1</u> BOULDERS [1]      | <u>1</u> LOGS OR WOODY DEBRIS [1] | <input type="checkbox"/> - MODERATE 25-75% [7]    |
| <u>2</u> ROOTMATS [1]                 | COMMENTS: _____            |                                   | <input type="checkbox"/> - SPARSE 5-25% [3]       |
|                                       |                            |                                   | <input type="checkbox"/> - NEARLY ABSENT < 5% [1] |

Cover  
8  
 Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

| SINUOSITY                                      | DEVELOPMENT                                    | CHANNELIZATION                                                  | STABILITY                                     | MODIFICATIONS/OTHER                                                                    |
|------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------|
| <input type="checkbox"/> - HIGH [4]            | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                             | <input type="checkbox"/> - HIGH [3]           | <input type="checkbox"/> - SNAGGING <input type="checkbox"/> - IMPOUND.                |
| <input type="checkbox"/> - MODERATE [3]        | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]                        | <input type="checkbox"/> - MODERATE [2]       | <input checked="" type="checkbox"/> - RELOCATION <input type="checkbox"/> - ISLANDS    |
| <input type="checkbox"/> - LOW [2]             | <input type="checkbox"/> - FAIR [3]            | <input type="checkbox"/> - RECOVERING [3]                       | <input checked="" type="checkbox"/> - LOW [1] | <input checked="" type="checkbox"/> - CANOPY REMOVAL <input type="checkbox"/> - LEVEED |
| <input checked="" type="checkbox"/> - NONE [1] | <input checked="" type="checkbox"/> - POOR [1] | <input checked="" type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                               | <input type="checkbox"/> - DREDGING <input checked="" type="checkbox"/> - BANK SHAPING |
|                                                |                                                |                                                                 |                                               | <input checked="" type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS                   |

COMMENTS: \_\_\_\_\_

Channel  
4  
 Max 20

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

| RIPARIAN WIDTH                                             |                                                                        | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)        |                                                               | BANK EROSION                                       |  |
|------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------|--|
| L R (Per Bank)                                             | L R (Most Predominant Per Bank)                                        | L R                                                  | L R                                                           | L R (Per Bank)                                     |  |
| <input type="checkbox"/> - WIDE > 50m [4]                  | <input type="checkbox"/> - FOREST, SWAMP [3]                           | <input type="checkbox"/> - CONSERVATION TILLAGE [1]  | <input type="checkbox"/> - URBAN OR INDUSTRIAL [0]            | <input type="checkbox"/> - NONE/LITTLE [3]         |  |
| <input type="checkbox"/> - MODERATE 10-50m [3]             | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]                      | <input type="checkbox"/> - OPEN PASTURE, ROWCROP [0] | <input checked="" type="checkbox"/> - MINING/CONSTRUCTION [0] | <input checked="" type="checkbox"/> - MODERATE [2] |  |
| <input type="checkbox"/> - NARROW 5-10 m [2]               | <input checked="" type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] |                                                      |                                                               | <input type="checkbox"/> - HEAVY/SEVERE [1]        |  |
| <input checked="" type="checkbox"/> - VERY NARROW < 5m [1] | <input type="checkbox"/> - FENCED PASTURE [1]                          |                                                      |                                                               |                                                    |  |
| <input type="checkbox"/> - NONE [0]                        |                                                                        |                                                      |                                                               |                                                    |  |

COMMENTS: \_\_\_\_\_

Riparian  
3 1/2  
 Max 10

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                            | MORPHOLOGY (Check 1 or 2 & AVERAGE)                      | CURRENT VELOCITY [ POOLS & RIFFLES! ] (Check All That Apply)                         |
|-------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------|
| <input type="checkbox"/> - >1m [6]                    | <input type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> - EDDIES [1] <input type="checkbox"/> - TORRENTIAL [-1]     |
| <input type="checkbox"/> - 0.7-1m [4]                 | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> - FAST [1] <input type="checkbox"/> - INTERSTITIAL [-1]     |
| <input type="checkbox"/> - 0.4-0.7m [2]               | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]    | <input type="checkbox"/> - MODERATE [1] <input type="checkbox"/> - INTERMITTENT [-2] |
| <input type="checkbox"/> - 0.2-0.4m [1]               |                                                          | <input type="checkbox"/> - SLOW [1] <input type="checkbox"/> - VERY FAST [1]         |
| <input checked="" type="checkbox"/> - < 0.2m [POOL=0] | COMMENTS: _____                                          |                                                                                      |

Pool/Current  
0  
 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                                       | RUN DEPTH                               | RIFFLE/RUN SUBSTRATE                                            | RIFFLE/RUN EMBEDDEDNESS                   |
|--------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|-------------------------------------------|
| <input type="checkbox"/> - Best Areas >10 cm [2]                   | <input type="checkbox"/> - MAX > 50 [2] | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> - NONE [2]       |
| <input type="checkbox"/> - Best Areas 5-10 cm [1]                  | <input type="checkbox"/> - MAX < 50 [1] | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> - LOW [1]        |
| <input checked="" type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0] |                                         | <input type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> - MODERATE [0]   |
| COMMENTS: _____                                                    |                                         | <input type="checkbox"/> - NO RIFFLE [Metric=0]                 | <input type="checkbox"/> - EXTENSIVE [-1] |

Riffle/Run  
0  
 Max 8  
 Gradient  
4  
 Max 10

6] GRADIENT (ft/mi): 3.7 DRAINAGE AREA (sq.mi.): 3.7  
 %POOL: 20 %GLIDE: 50  
 %RIFFLE: 10 %RUN: 20

\* Best areas must be large enough to support a population of riffle-obligate species

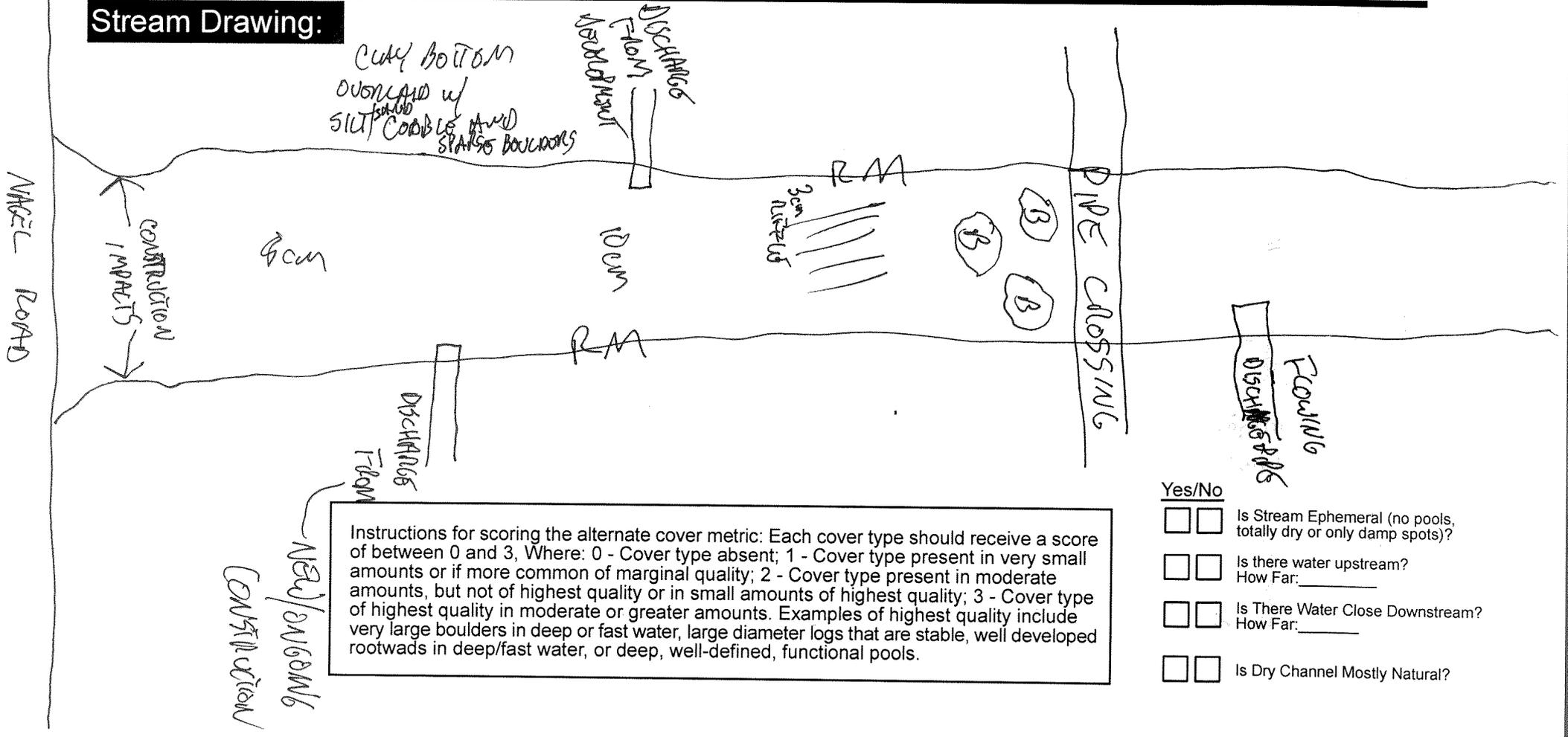
Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                          |                          |                           |                    |                      |                    |                      |                 |                 |
|--------------------------|--------------------------|---------------------------|--------------------|----------------------|--------------------|----------------------|-----------------|-----------------|
| <input type="checkbox"/> | <input type="checkbox"/> | Gear: _____               | Distance: _____    | Water Clarity: _____ | Water Stage: _____ | Canopy -% Open _____ |                 |                 |
| Subjective Rating (1-10) | Aesthetic Rating (1-10)  | First Sampling Pass _____ |                    |                      |                    |                      |                 |                 |
| Stream Measurements:     |                          |                           |                    |                      |                    |                      |                 |                 |
| Average Width            | Average Depth            | Maximum Depth             | Av. Bankfull Width | Bankfull Depth       | Mean W/D Ratio     | Bankfull Max Depth   | Floodprone Area | Entrench. Ratio |
|                          |                          |                           |                    |                      |                    |                      |                 |                 |

- Low,  - Moderate,  - High

**Stream Drawing:**



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Schwartz Ditch 1.25  
Stream Segment Location: At Williams Street  
QHEI Score: NA HHEI Score: NA

---

FIELD NOTES: 10 SEP 2002

This stretch of Schwartz Ditch is located crossing Williams Court, a one-lane paved road. No data was taken due to a lack of access. A 10-15' wide buffer of green ash, American elm, gray-stemmed dogwood and pin oak located on each bank separates the ditch from nearby residential development.

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PHOTOS:



1) Schwartz Ditch 1.25 – Facing upstream from bridge



2) Schwartz Ditch 1.25 – Facing downstream from bridge

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Schwartz Ditch 2.12  
Stream Segment Location: At Bradley/Hillard Roads (Cuyahoga County)  
QHEI Score: NA HHEI Score: NA

---

FIELD NOTES: 10 SEP 2002

This stretch of Schwartz Ditch is located crossing Bradley and Hillard Roads in the town of Westlake, Cuyahoga County. Long sections of the ditch flow through culverts, including a stretch from the west side of Bradley to the east side of Hillard. The stream appears to enter a fenced detention pond on the east side of Hillard, surrounded by residential development.

---

PHOTOS:



1) Schwartz Ditch 2.12 – Facing downstream from Bradley Road

**MILLS CREEK NOTES**

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Mills Creek 0.22

Stream Segment Location: At Jaycox Road

QHEI Score: 31.5

HHEI Score: NA

---

**FIELD NOTES:**

This stretch of Mills Creek is located downstream (east) of Jaycox Road. Parts of the creek were dry with intermittent pools up to 15-cm. deep. The pools contained minnows. Long-leaf pondweed was seen growing in portions of the creek bed. Although the substrate was a mix of sand, silt, muck, cobbles, clay and gravel, a high concentration of cobbles was noted immediately upstream of the Jaycox Road bridge. Crayfish and minnows were also noted in the pools in the 10' wide creek. The 5-6' high banks provided a narrow (10' wide) buffer to the adjacent residential lawns. This herbaceous buffer is dominated by Canada goldenrod, Canada thistle, and teasel. The channel has apparently been reshaped to accommodate residential development.

---

**PHOTOS:**



1) Mills Creek 0.22 – Facing downstream from Jaycox Road



2) Mills Creek 0.22 – Facing upstream from Jaycox Road



Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 31.5

River Code: RM: 0.22 Stream: MILLS CREEK
Date: 9/11/02 Location: AT JAYCOX ROAD
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
BLDR /SLBS [10] GRAVEL [7] 25 Check ONE (OR 2 & AVERAGE)
BOULDER [9] SAND [6] 15 LESTONE [1] SILT: SILT HEAVY [-2]
COBBLE [8] 5 BEDROCK [5] TILLS [1] SILT MODERATE [-1]
HARDPAN [4] 25 DETRITUS [3] WETLANDS [0] SILT NORMAL [0]
MUCK [2] 20 ARTIFICIAL [0] HARDPAN [0] SILT FREE [1]
SILT [2] 10 NOTE: Ignore Sludge Originating From Point Sources
SANDSTONE [0] EMBEDDED EXTENSIVE [-2]
RIP/RAP [0] NESS: MODERATE [-1]
LACUSTRINE [0] NORMAL [0]
SHALE [-1] NONE [1]
COAL FINES [-2]

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)
Structure TYPE: Score All That Occur AMOUNT: (Check ONLY One or check 2 and AVERAGE)
UNDERCUT BANKS [1] POOLS > 70 cm [2] OXBOWS, BACKWATERS [1]
OVERHANGING VEGETATION [1] ROOTWADS [1] AQUATIC MACROPHYTES [1]
SHALLOWS (IN SLOW WATER) [1] BOULDERS [1] LOGS OR WOODY DEBRIS [1]
ROOTMATS [1] COMMENTS: Cover
EXTENSIVE > 75% [11]
MODERATE 25-75% [7]
SPARSE 5-25% [3]
NEARLY ABSENT < 5% [1]

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
HIGH [4] EXCELLENT [7] NONE [6] HIGH [3] SNAGGING IMPOUND.
MODERATE [3] GOOD [5] RECOVERED [4] MODERATE [2] RELOCATION ISLANDS
LOW [2] FAIR [3] RECOVERING [3] LOW [1] CANOPY REMOVAL LEVEED
NONE [1] POOR [1] RECENT OR NO RECOVERY [1] DREDGING BANK SHAPING
ONE SIDE CHANNEL MODIFICATIONS

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)
WIDE > 50m [4] FOREST, SWAMP [3] CONSERVATION TILLAGE [1] NONE/LITTLE [3]
MODERATE 10-50m [3] SHRUB OR OLD FIELD [2] URBAN OR INDUSTRIAL [0] MODERATE [2]
NARROW 5-10 m [2] RESIDENTIAL, PARK, NEW FIELD [1] OPEN PASTURE, ROWCROP [0] HEAVY/SEVERE [1]
VERY NARROW < 5 m [1] FENCED PASTURE [1] MINING/CONSTRUCTION [0]
NONE [0]

5) POOL/GLIDE AND RIFFLE/RUN QUALITY
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [ POOLS & RIFFLES! ]
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)
>1m [6] POOL WIDTH > RIFFLE WIDTH [2] EDDIES [1] TORRENTIAL [-1]
0.7-1m [4] POOL WIDTH = RIFFLE WIDTH [1] FAST [1] INTERSTITIAL [-1]
0.4-0.7m [2] POOL WIDTH < RIFFLE W. [0] MODERATE [1] INTERMITTENT [-2]
0.2- 0.4m [1] SLOW [1] VERY FAST [1]
< 0.2m [POOL=0] COMMENTS: Pool/Current

CHECK ONE OR CHECK 2 AND AVERAGE
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS
Best Areas > 10 cm [2] MAX > 50 [2] STABLE (e.g., Cobble, Boulder) [2] NONE [2]
Best Areas 5-10 cm [1] MAX < 50 [1] MOD. STABLE (e.g., Large Gravel) [1] LOW [1]
Best Areas < 5 cm RIFFLE=0 UNSTABLE (Fine Gravel, Sand) [0] MODERATE [0]
COMMENTS: NO RIFFLE NO RIFFLE [Metric=0] EXTENSIVE [-1]

6) GRADIENT (ft/mi): 19.6 DRAINAGE AREA (sq.mi.): 4.7
%POOL: 10 %GLIDE: 90
%RIFFLE: %RUN:

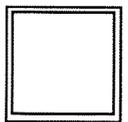
Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_

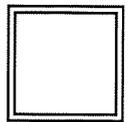
\_\_\_\_\_

\_\_\_\_\_

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_



Subjective Rating (1-10)



Aesthetic Rating (1-10)

Gradient:  - Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open: \_\_\_\_\_

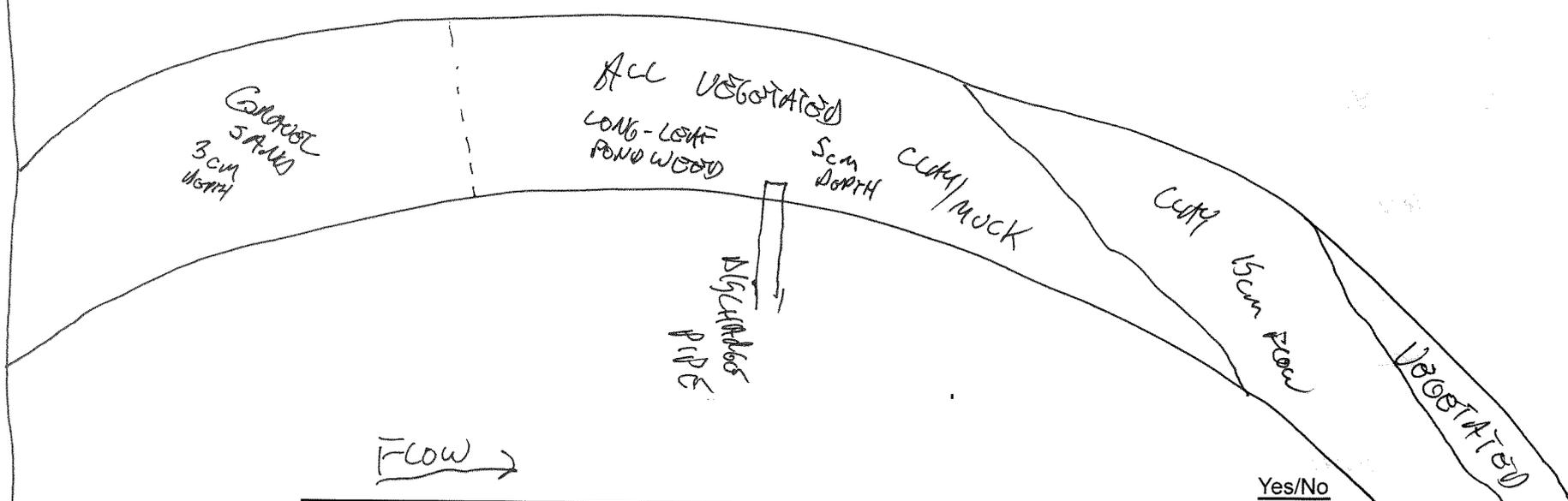
First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|
|               |               |               |                    |                |                |                    |                 |                 |

**Stream Drawing:**

SANDY ROAD



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Mills Creek 0.75  
Stream Segment Location: At St. Maron Blvd.  
QHEI Score: NA HHEI Score: NA

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FIELD NOTES: 11 SEP 2002

This portion of Mills Creek is located north and south of St. Maron Boulevard within the Red Tail Subdivision and Golf Club. No data were taken at this location due to lack of access and severe modifications which made QHEI evaluation inapplicable. This portion of Mills Creek has been recently severely altered through culverting, reshaping, rerouting and the development of several ponds within the creek. Some herbaceous vegetation has re-established on the re-shaped topography. A golf course is located on the west bank to the south of St. Maron.

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PHOTOS:



- 1) Mills Creek 0.75 – Mills Creek at Saint Maron Blvd pond/dam on east side of road



2) Mills Creek 0.75 – Saint Maron Blvd detention basin on west side of road

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Mills Creek 1.32

Stream Segment Location: At Nagle Road

QHEI Score: 45.5

HHEI Score: NA

---

FIELD NOTES: 11 SEP 2002

This portion of Mills Creek is located upstream (east) of Nagle Road. The 40-50' wide herbaceous riparian buffer contained perennial ryegrass, Canada goldenrod, blue vervain, reed canary grass, spotted touch-me-not, and purple loosestrife. The 9-12' wide, 5-25 cm. deep channel contained frogs, minnows, and crayfish. Some algae was noted, indicating eutrophication. The substrate was dominated by hardpan and gravel with lesser amounts of cobble, boulders, sand, and silt.

---

PHOTOS:



1) Mills Creek 1.32 – Facing upstream at Nagle Road



2) Mills Creek 1.32 – Mills Creek at Nagle Road, downstream from end of site



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **45.5**

River Code: RM: 1.32 Stream: MILLS CREEK  
 Date: 9/11/02 Location: AT NAGEL ROAD  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

| TYPE                                                         | POOL                | RIFFLE | POOL                                               | RIFFLE                                    | SUBSTRATE ORIGIN                                   | SUBSTRATE QUALITY                                       |
|--------------------------------------------------------------|---------------------|--------|----------------------------------------------------|-------------------------------------------|----------------------------------------------------|---------------------------------------------------------|
| <input type="checkbox"/> -BLDR /SLBS[10]                     |                     |        | <input checked="" type="checkbox"/> -GRAVEL [7]    | <u>25</u> <u>25</u>                       | Check ONE (OR 2 & AVERAGE)                         | Check ONE (OR 2 & AVERAGE)                              |
| <input type="checkbox"/> -BOULDER [9]                        | <u>10</u>           |        | <input type="checkbox"/> -SAND [6]                 | <u>10</u> <u>5</u>                        | <input type="checkbox"/> -LIMESTONE [1]            | <input type="checkbox"/> - SILT HEAVY [-2]              |
| <input type="checkbox"/> -COBBLE [8]                         | <u>10</u> <u>20</u> |        | <input type="checkbox"/> -BEDROCK[5]               |                                           | <input checked="" type="checkbox"/> -TILLS [1]     | <input checked="" type="checkbox"/> -SILT MODERATE [-1] |
| <input checked="" type="checkbox"/> -HARDPAN [4]             | <u>40</u> <u>30</u> |        | <input type="checkbox"/> -DETRITUS[3]              |                                           | <input type="checkbox"/> -WETLANDS[0]              | <input type="checkbox"/> -SILT NORMAL [0]               |
| <input type="checkbox"/> -MUCK [2]                           |                     |        | <input type="checkbox"/> -ARTIFICIAL[0]            |                                           | <input checked="" type="checkbox"/> -HARDPAN [0]   | <input type="checkbox"/> -SILT FREE [1]                 |
| <input type="checkbox"/> -SILT [2]                           | <u>15</u> <u>10</u> |        | NOTE: Ignore Sludge Originating From Point Sources |                                           | <input type="checkbox"/> -SANDSTONE [0]            | <input type="checkbox"/> -EXTENSIVE [-2]                |
| -----                                                        |                     |        | <input type="checkbox"/> -RIP/RAP [0]              | NESS:                                     | <input checked="" type="checkbox"/> -MODERATE [-1] | Substrate<br><b>11/2</b><br>Max 20                      |
| NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >) |                     |        | <input checked="" type="checkbox"/> -4 or More [2] | <input type="checkbox"/> -LACUSTRINE [0]  | <input type="checkbox"/> -NORMAL [0]               |                                                         |
| COMMENTS                                                     |                     |        | <input type="checkbox"/> -3 or Less [0]            | <input type="checkbox"/> -SHALE [-1]      | <input type="checkbox"/> -NONE [1]                 |                                                         |
|                                                              |                     |        |                                                    | <input type="checkbox"/> -COAL FINES [-2] |                                                    |                                                         |

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| (Structure)                           | TYPE: Score All That Occur | AMOUNT: (Check ONLY One or check 2 and AVERAGE)   | Cover              |
|---------------------------------------|----------------------------|---------------------------------------------------|--------------------|
| <u>1</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <input type="checkbox"/> - EXTENSIVE > 75% [11]   | <b>7</b><br>Max 20 |
| <u>1</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <input type="checkbox"/> - MODERATE 25-75% [7]    |                    |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>2</u> BOULDERS [1]      | <input type="checkbox"/> - SPARSE 5-25% [3]       |                    |
| <u>1</u> ROOTMATS [1]                 | COMMENTS:                  | <input type="checkbox"/> - NEARLY ABSENT < 5% [1] |                    |

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                     | DEVELOPMENT                                    | CHANNELIZATION                                       | STABILITY                                          | MODIFICATIONS/OTHER                                  | Channel                                                              |
|-----------------------------------------------|------------------------------------------------|------------------------------------------------------|----------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------------|
| <input type="checkbox"/> - HIGH [4]           | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                  | <input type="checkbox"/> - HIGH [3]                | <input type="checkbox"/> - SNAGGING                  | <b>10</b><br>Max 20                                                  |
| <input type="checkbox"/> - MODERATE [3]       | <input type="checkbox"/> - GOOD [5]            | <input type="checkbox"/> - RECOVERED [4]             | <input checked="" type="checkbox"/> - MODERATE [2] | <input type="checkbox"/> - RELOCATION                |                                                                      |
| <input checked="" type="checkbox"/> - LOW [2] | <input checked="" type="checkbox"/> - FAIR [3] | <input checked="" type="checkbox"/> - RECOVERING [3] | <input type="checkbox"/> - LOW [1]                 | <input checked="" type="checkbox"/> - CANOPY REMOVAL |                                                                      |
| <input type="checkbox"/> - NONE [1]           | <input type="checkbox"/> - POOR [1]            | <input type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                                    | <input type="checkbox"/> - DREDGING                  |                                                                      |
|                                               |                                                |                                                      |                                                    |                                                      | <input checked="" type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS |

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

| RIPARIAN WIDTH                                             |                                                                        | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)        |                                                    | BANK EROSION                                       |  | Riparian           |
|------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------|----------------------------------------------------|--|--------------------|
| L R (Per Bank)                                             | L R (Most Predominant Per Bank)                                        | L R                                                  | L R                                                | L R (Per Bank)                                     |  |                    |
| <input type="checkbox"/> - WIDE > 50m [4]                  | <input type="checkbox"/> - FOREST, SWAMP [3]                           | <input type="checkbox"/> - CONSERVATION TILLAGE [1]  | <input type="checkbox"/> - URBAN OR INDUSTRIAL [0] | <input type="checkbox"/> - NONE/LITTLE [3]         |  | <b>4</b><br>Max 10 |
| <input type="checkbox"/> - MODERATE 10-50m [3]             | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]                      | <input type="checkbox"/> - OPEN PASTURE, ROWCROP [0] | <input type="checkbox"/> - MINING/CONSTRUCTION [0] | <input checked="" type="checkbox"/> - MODERATE [2] |  |                    |
| <input type="checkbox"/> - NARROW 5-10 m [2]               | <input checked="" type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] |                                                      |                                                    | <input type="checkbox"/> - HEAVY/SEVERE [1]        |  |                    |
| <input checked="" type="checkbox"/> - VERY NARROW <5 m [1] | <input type="checkbox"/> - FENCED PASTURE [1]                          |                                                      |                                                    |                                                    |  |                    |
| <input type="checkbox"/> - NONE [0]                        |                                                                        |                                                      |                                                    |                                                    |  |                    |

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                          | MORPHOLOGY (Check 1 or 2 & AVERAGE)                                 | CURRENT VELOCITY [ POOLS & RIFFLES! ] (Check All That Apply) | Pool/Current                                 |
|-----------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------|
| <input type="checkbox"/> - >1m [6]                  | <input checked="" type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> - EDDIES [1]                        | <b>4</b><br>Max 12                           |
| <input type="checkbox"/> - 0.7-1m [4]               | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> - FAST [1]                          |                                              |
| <input type="checkbox"/> - 0.4-0.7m [2]             | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> - MODERATE [1]                      |                                              |
| <input checked="" type="checkbox"/> - 0.2- 0.4m [1] |                                                                     | <input checked="" type="checkbox"/> - SLOW [1]               |                                              |
| <input type="checkbox"/> - < 0.2m [POOL=0]          | COMMENTS:                                                           | <input type="checkbox"/> - TORRENTIAL [-1]                   |                                              |
|                                                     |                                                                     |                                                              | <input type="checkbox"/> - INTERSTITIAL [-1] |
|                                                     |                                                                     |                                                              | <input type="checkbox"/> - INTERMITTENT [-2] |
|                                                     |                                                                     |                                                              | <input type="checkbox"/> - VERY FAST [1]     |

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                                 | RUN DEPTH                                          | RIFFLE/RUN SUBSTRATE                                                       | RIFFLE/RUN EMBEDDEDNESS                            | Riffle/Run                     |
|--------------------------------------------------------------|----------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------|--------------------------------|
| <input type="checkbox"/> - Best Areas >10 cm [2]             | <input type="checkbox"/> - MAX > 50 [2]            | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]              | <input type="checkbox"/> - NONE [2]                | <b>3</b><br>Max 8              |
| <input checked="" type="checkbox"/> - Best Areas 5-10 cm [1] | <input checked="" type="checkbox"/> - MAX < 50 [1] | <input checked="" type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> - LOW [1]                 |                                |
| <input type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0]      |                                                    | <input type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0]                | <input checked="" type="checkbox"/> - MODERATE [0] | Gradient<br><b>6</b><br>Max 10 |
| COMMENTS:                                                    |                                                    | <input type="checkbox"/> - NO RIFFLE [Metric=0]                            | <input type="checkbox"/> - EXTENSIVE [-1]          |                                |

6) GRADIENT (ft/mi): 6.1 DRAINAGE AREA (sq.mi.): 2.5  
 %POOL: 25 %GLIDE: 45  
 %RIFFLE: 20 %RUN: 10

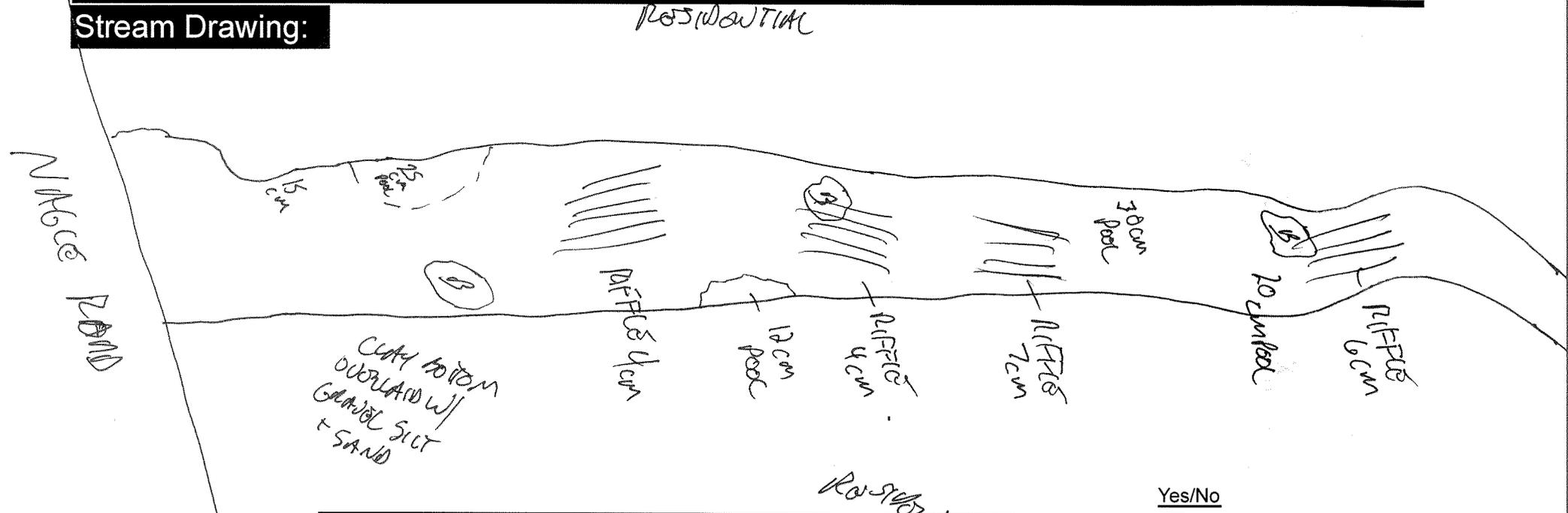
\*: Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                                                                                                                  |                                                                                                                 |                           |                    |                      |                    |                      |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------|--------------------|----------------------|--------------------|----------------------|
|                                                                                                                  |                                                                                                                 | Gear: _____               | Distance: _____    | Water Clarity: _____ | Water Stage: _____ | Canopy -% Open _____ |
| <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Subjective Rating (1-10) | <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> Aesthetic Rating (1-10) | First Sampling Pass _____ |                    |                      |                    |                      |
| Stream Measurements:                                                                                             |                                                                                                                 |                           |                    |                      |                    |                      |
| Average Width                                                                                                    | Average Depth                                                                                                   | Maximum Depth             | Av. Bankfull Width | Bankfull Mean Depth  | W/D Ratio          | Bankfull Max Depth   |
| Floodprone Area                                                                                                  | Entrench. Ratio                                                                                                 |                           |                    |                      |                    |                      |
| █ - Low, █ - Moderate, █ - High                                                                                  |                                                                                                                 |                           |                    |                      |                    |                      |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Mills Creek 1.55

Stream Segment Location: At Mills Road

QHEI Score: 51.5

HHEI Score: NA

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FIELD NOTES: 11 SEP 2002

This stretch of Mills Creek is located upstream (south) of Mills Road. The 10-14' wide, 0-15 cm. deep channel had a gravel-dominated substrate with lesser amounts of sand, silt, boulders and cobbles. The west bank has no riparian buffer (lawn) with a 10' +/- wide buffer on the east bank dominated by Canada goldenrod, multiflora rose, boxelder, green ash, red maple and black willow. Minnows were noted along with minor amounts of algae. A culvert discharges water from the residential area to the east approximately 300' from Mills Road.

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PHOTOS:



1) Mills Creek 1.55 – Facing upstream at Mills Road



2) Mills Creek 1.55 – Facing downstream at Mills Road



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

51.5

River Code: RM: 1.55 Stream: MILLS CREEK
Date: 9/11/02 Location: AT MILLS ROAD
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)
Substrate Max 20

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >)
4 or More [2]
3 or Less [0]
COMMENTS:

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)
AMOUNT: (Check ONLY One or check 2 and AVERAGE)
Cover Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
Channel Max 20

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION
Riparian Max 10

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [ POOLS & RIFFLES! ]
Pool/ Current Max 12

CHECK ONE OR CHECK 2 AND AVERAGE
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS
Riffle/Run Max 8
Gradient Max 10

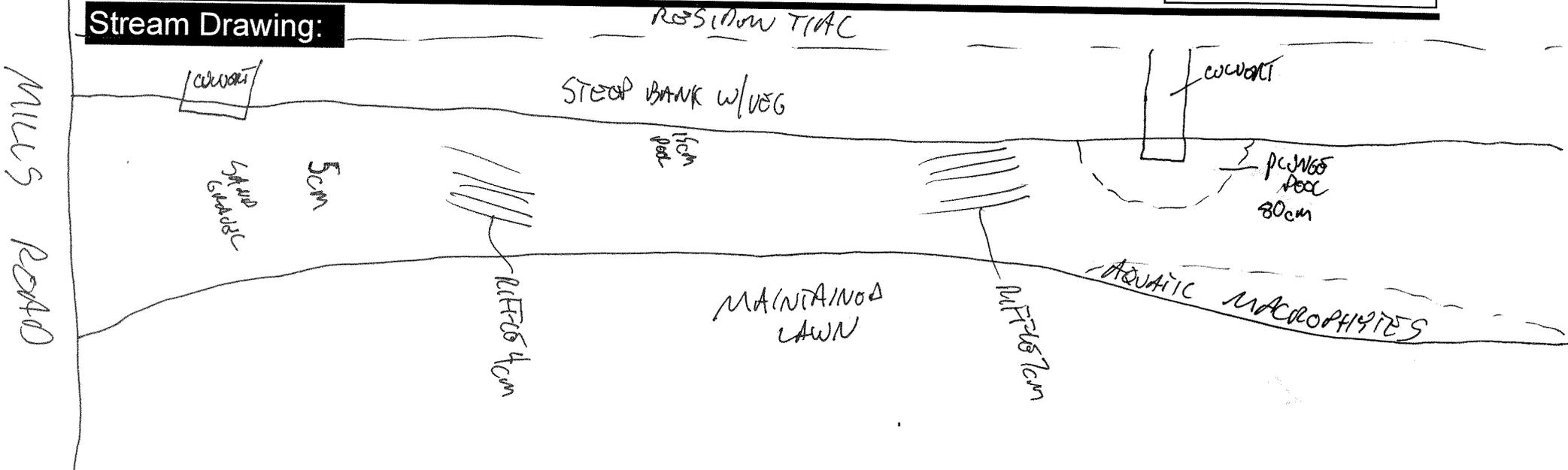
6] GRADIENT (ft/mi): 6.4 DRAINAGE AREA (sq.mi.): 2.5
%POOL: 30 %GLIDE: 35
%RIFFLE: 15 %RUN: 20

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                                                                                                                |                          |                           |                    |                      |                    |                      |                 |                 |       |
|----------------------------------------------------------------------------------------------------------------|--------------------------|---------------------------|--------------------|----------------------|--------------------|----------------------|-----------------|-----------------|-------|
| <input type="checkbox"/>                                                                                       | <input type="checkbox"/> | Gear: _____               | Distance: _____    | Water Clarity: _____ | Water Stage: _____ | Canopy -% Open _____ |                 |                 |       |
| Subjective Rating (1-10)                                                                                       | Aesthetic Rating (1-10)  | First Sampling Pass _____ |                    |                      |                    |                      |                 |                 |       |
| Gradient: <input type="checkbox"/> - Low, <input type="checkbox"/> - Moderate, <input type="checkbox"/> - High |                          | Stream Measurements:      |                    |                      |                    |                      |                 |                 |       |
| Average Width                                                                                                  | Average Depth            | Maximum Depth             | Av. Bankfull Width | Bankfull Depth       | Mean W/D Ratio     | Bankfull Max Depth   | Floodprone Area | Entrench. Width | Ratio |
|                                                                                                                |                          |                           |                    |                      |                    |                      |                 |                 |       |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Mills Creek 2.5  
Stream Segment Location: At Mills Creek Lane (in sports park)  
QHEI Score: 52.75 HHEI Score: NA

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FIELD NOTES: 11 SEP 2002

This portion of Mills Creek is located in Frontier Park, operated by the city of North Ridgeville. The 13-20' wide, 5-20 cm deep portion of creek has a substrate dominated by cobbles with lesser amounts of boulders, gravel, sand and silt. The 10-15' wide herbaceous buffer contains Canada goldenrod, reed canary grass, silky dogwood, purple loosestrife, blue vervain, eastern cottonwood, perennial ryegrass, cattails, peppermint and Queen Anne's lace. Minnows were noted in the pools. A football field is located to the east of the creek with a parking lot to the west. A footbridge connects the two. Garbage was noted on either side of the bridge. There is a potential for restoration at this site.

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PHOTOS:



1) Mills Creek 2.5 – Creek at Mills Creek Lane (Football Park), upstream from end



2) Mills Creek 2.5 – Creek at Mills Creek Lane (Football Park), downstream from end



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

52 3/4

River Code: RM: 2.5 Stream: MILLS CREEK

Date: 9/11/07 Location: MILLS CREEK LAKE (IN SPORTS PARK)

Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present

TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
BLDR /SLBS[10] GRAVEL [7] SAND [6] LIMESTONE [1] SILT:
BOULDER [9] COBBLE [8] HARDPAN [4] MUCK [2] SILT [2]
BEDROCK[5] DETRITUS[3] ARTIFICIAL[0]
NOTE: Ignore Sludge Originating From Point Sources
CHECK ONE (OR 2 & AVERAGE)

Substrate 16 Max 20

NUMBER OF SUBSTRATE TYPES: 4 or More [2] 3 or Less [0]

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

TYPE: Score All That Occur
UNDERCUT BANKS [1] POOLS > 70 cm [2] OXBOWS, BACKWATERS [1]
OVERHANGING VEGETATION [1] ROOTWADS [1] AQUATIC MACROPHYTES [1]
SHALLOWS (IN SLOW WATER) [1] BOULDERS [1] LOGS OR WOODY DEBRIS [1]
ROOTMATS [1] COMMENTS:

Cover 8 Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
HIGH [4] EXCELLENT [7] NONE [6] HIGH [3] SNAGGING IMPOUND.
MODERATE [3] GOOD [5] RECOVERED [4] MODERATE [2] RELOCATION ISLANDS
LOW [2] FAIR [3] RECOVERING [3] LOW [1] CANOPY REMOVAL OR LEVEED
NONE [1] POOR [1] RECENT OR NO RECOVERY [1] DREDGING BANK SHAPING
ONE SIDE CHANNEL MODIFICATIONS

Channel 11 Max 20

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)
WIDE > 50m [4] FOREST, SWAMP [3] CONSERVATION TILLAGE [1] NONE/LITTLE [3]
MODERATE 10-50m [3] SHRUB OR OLD FIELD [2] URBAN OR INDUSTRIAL [0] MODERATE [2]
NARROW 5-10 m [2] RESIDENTIAL, PARK, NEW FIELD [1] OPEN PASTURE, ROWCROP [0] HEAVY/SEVERE [1]
VERY NARROW <5 m [1] FENCED PASTURE [1] MINING/CONSTRUCTION [0]

Riparian 4 3/4 Max 10

COMMENTS:

5.) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAX. DEPTH MORPHOLOGY CURRENT VELOCITY ( POOLS & RIFFLES!)
>1m [6] POOL WIDTH > RIFFLE WIDTH [2] EDDIES [1] TORRENTIAL [-1]
0.7-1m [4] POOL WIDTH = RIFFLE WIDTH [1] FAST [1] INTERSTITIAL [-1]
0.4-0.7m [2] POOL WIDTH < RIFFLE W. [0] MODERATE [1] INTERMITTENT [-2]
0.2-0.4m [1] SLOW [1] VERY FAST [1]
< 0.2m [POOL=0] COMMENTS:

Pool/Current 4 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS
Best Areas >10 cm [2] MAX > 50 [2] STABLE (e.g., Cobble, Boulder) [2] NONE [2]
Best Areas 5-10 cm [1] MAX < 50 [1] MOD. STABLE (e.g., Large Gravel) [1] LOW [1]
Best Areas < 5 cm [RIFFLE=0] UNSTABLE (Fine Gravel, Sand) [0] MODERATE [0]
EXTENSIVE [-1]

Riffle/Run 3 Max 8

COMMENTS:

Gradient 6 Max 10

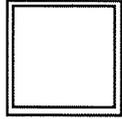
6) GRADIENT (ft/mi): 8.8 DRAINAGE AREA (sq.mi.): 2.0 %POOL: 35 %GLIDE: 10
%RIFFLE: 35 %RUN: 20

\* Best areas must be large enough to support a population of riffle-obligate species

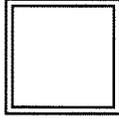
Is Sampling Reach Representative of the Stream (Y/N)\_\_\_ If Not, Explain:

Major Suspected Sources of Impacts (Check All That Apply):

- None
- Industrial
- WWTP
- Ag
- Livestock
- Silviculture
- Construction
- Urban Runoff
- CSOs
- Suburban Impacts
- Mining
- Channelization
- Riparian Removal
- Landfills
- Natural
- Dams
- Other Flow Alteration
- Other: \_\_\_\_\_



Subjective Rating (1-10)



Aesthetic Rating (1-10)

Gradient:

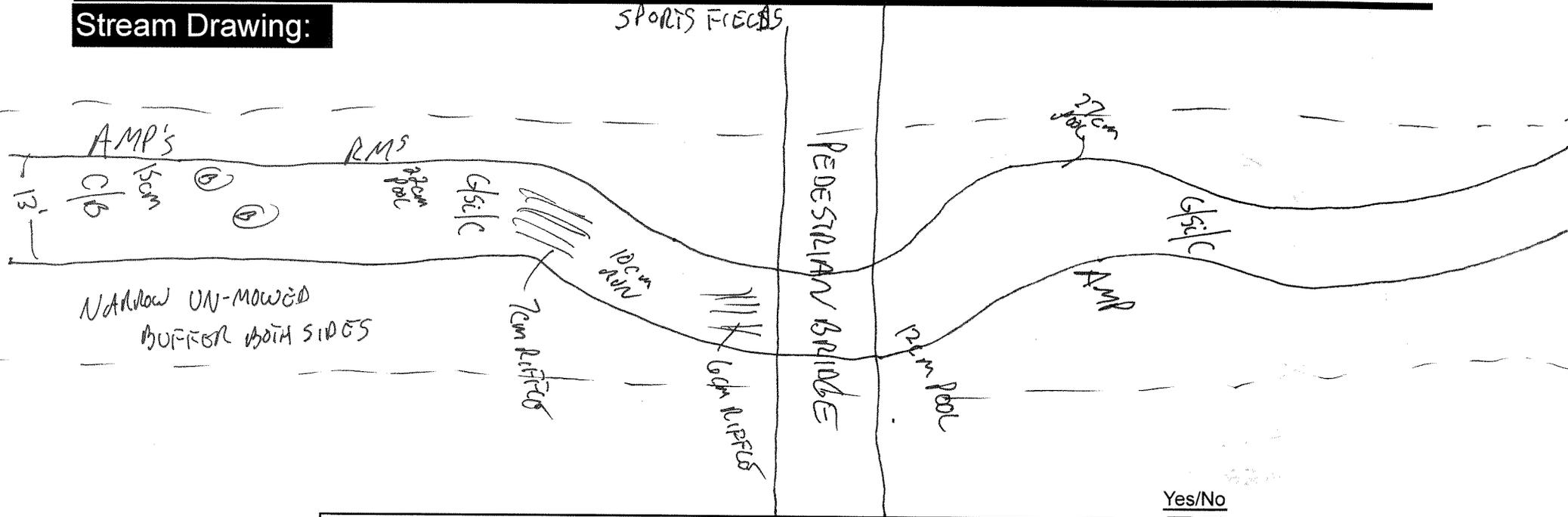
- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

| Stream Measurements: |               |               |                    |                |                |                    |                 |                 |       |      |
|----------------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|-------|------|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio | Width | Area |
|                      |               |               |                    |                |                |                    |                 |                 |       |      |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

PARKING LOT

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Mills Creek 2.7  
Stream Segment Location: At Center Ridge Road  
QHEI Score: 63 HHEI Score: NA

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**FIELD NOTES:**

This portion of Mills Creek is located upstream (south) of Center Ridge Road. This 12-17' wide, 5-20 cm deep channel is dominated by a substrate of cobbles, boulders, gravel and sand. Frogs, minnows, and crayfish were noted. The 15' +/- wide buffer on each bank is forested and dominated by red maple, green ash, European buckthorn, tartarian honeysuckle, black walnut, boxelder, sugar maple, black cherry, and multiflora rose. The developers of the adjacent condominiums did a fantastic job incorporating the creek while maintaining its natural course and functions.

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**PHOTOS:**



1) Mills Creek 2.7 – Facing upstream from Center Ridge Road



2) Mills Creek 2.7 – Facing downstream from Center Ridge Road



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: 63

River Code: RM: 207 Stream: MILLS CREEK  
Date: 9/11/02 Location: AT CENTER RIDGE ROAD  
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                                                         | POOL RIFFLE | POOL RIFFLE                                                        | SUBSTRATE ORIGIN                                | SUBSTRATE QUALITY                                   |
|------------------------------------------------------------------------------|-------------|--------------------------------------------------------------------|-------------------------------------------------|-----------------------------------------------------|
| <input type="checkbox"/> BLDR /SLBS [10]                                     |             | <input checked="" type="checkbox"/> GRAVEL [7] <u>30</u> <u>25</u> | Check ONE (OR 2 & AVERAGE)                      | Check ONE (OR 2 & AVERAGE)                          |
| <input type="checkbox"/> BOULDER [9] <u>15</u> <u>20</u>                     |             | <input type="checkbox"/> SAND [6] <u>25</u> <u>15</u>              | <input type="checkbox"/> LIMESTONE [1] SILT:    | <input type="checkbox"/> SILT HEAVY [-2]            |
| <input checked="" type="checkbox"/> COBBLE [8] <u>30</u> <u>40</u>           |             | <input type="checkbox"/> BEDROCK [5]                               | <input checked="" type="checkbox"/> TILLS [1]   | <input type="checkbox"/> SILT MODERATE [-1]         |
| <input type="checkbox"/> HARDPAN [4]                                         |             | <input type="checkbox"/> DETRITUS [3]                              | <input type="checkbox"/> WETLANDS [0]           | <input checked="" type="checkbox"/> SILT NORMAL [0] |
| <input type="checkbox"/> MUCK [2]                                            |             | <input type="checkbox"/> ARTIFICIAL [0]                            | <input type="checkbox"/> HARDPAN [0]            | <input type="checkbox"/> SILT FREE [1]              |
| <input type="checkbox"/> SILT [2]                                            |             | NOTE: Ignore Sludge Originating From Point Sources                 | <input type="checkbox"/> SANDSTONE [0] EMBEDDED | <input type="checkbox"/> EXTENSIVE [-2]             |
| -----                                                                        |             |                                                                    | <input type="checkbox"/> RIP/RAP [0] NESS:      | <input type="checkbox"/> MODERATE [-1]              |
| NUMBER OF SUBSTRATE TYPES: <input checked="" type="checkbox"/> 4 or More [2] |             |                                                                    | <input type="checkbox"/> LACUSTRINE [0]         | <input checked="" type="checkbox"/> NORMAL [0]      |
| (High Quality Only, Score 5 or >)                                            |             |                                                                    | <input type="checkbox"/> SHALE [-1]             | <input type="checkbox"/> NONE [1]                   |
| <input type="checkbox"/> 3 or Less [0]                                       |             |                                                                    | <input type="checkbox"/> COAL FINES [-2]        |                                                     |

COMMENTS: \_\_\_\_\_

18

  
Max 20

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| TYPE: Score All That Occur            | AMOUNT: (Check ONLY One or check 2 and AVERAGE) |
|---------------------------------------|-------------------------------------------------|
| <u>0</u> UNDERCUT BANKS [1]           | <input type="checkbox"/> EXTENSIVE > 75% [11]   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <input type="checkbox"/> MODERATE 25-75% [7]    |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <input type="checkbox"/> SPARSE 5-25% [3]       |
| <u>1</u> ROOTMATS [1] COMMENTS: _____ | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |
| <u>0</u> POOLS > 70 cm [2]            |                                                 |
| <u>1</u> ROOTWADS [1]                 |                                                 |
| <u>2</u> BOULDERS [1]                 |                                                 |
| <u>0</u> OXBOWS, BACKWATERS [1]       |                                                 |
| <u>0</u> AQUATIC MACROPHYTES [1]      |                                                 |
| <u>1</u> LOGS OR WOODY DEBRIS [1]     |                                                 |

9

  
Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                   | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY                                        | MODIFICATIONS/OTHER                                                |
|---------------------------------------------|----------------------------------------------|----------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------|
| <input type="checkbox"/> HIGH [4]           | <input type="checkbox"/> EXCELLENT [7]       | <input type="checkbox"/> NONE [6]                  | <input type="checkbox"/> HIGH [3]                | <input type="checkbox"/> SNAGGING                                  |
| <input type="checkbox"/> MODERATE [3]       | <input checked="" type="checkbox"/> GOOD [5] | <input checked="" type="checkbox"/> RECOVERED [4]  | <input checked="" type="checkbox"/> MODERATE [2] | <input type="checkbox"/> IMPOUND.                                  |
| <input checked="" type="checkbox"/> LOW [2] | <input type="checkbox"/> FAIR [3]            | <input type="checkbox"/> RECOVERING [3]            | <input type="checkbox"/> LOW [1]                 | <input type="checkbox"/> ISLANDS                                   |
| <input type="checkbox"/> NONE [1]           | <input type="checkbox"/> POOR [1]            | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                                  | <input checked="" type="checkbox"/> CANOPY REMOVAL                 |
|                                             |                                              |                                                    |                                                  | <input type="checkbox"/> LEVEED                                    |
|                                             |                                              |                                                    |                                                  | <input type="checkbox"/> DREDGING                                  |
|                                             |                                              |                                                    |                                                  | <input type="checkbox"/> BANK SHAPING                              |
|                                             |                                              |                                                    |                                                  | <input checked="" type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS |

13

  
Max 20

COMMENTS: \_\_\_\_\_

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

| RIPARIAN WIDTH                                        |                                                                      | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)      |                                                  | BANK EROSION                                     |  |
|-------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--|
| L R (Per Bank)                                        | L R (Most Predominant Per Bank)                                      | L R                                                | L R                                              | L R (Per Bank)                                   |  |
| <input type="checkbox"/> WIDE > 50m [4]               | <input type="checkbox"/> FOREST, SWAMP [3]                           | <input type="checkbox"/> CONSERVATION TILLAGE [1]  | <input type="checkbox"/> URBAN OR INDUSTRIAL [0] | <input type="checkbox"/> NONE/LITTLE [3]         |  |
| <input type="checkbox"/> MODERATE 10-50m [3]          | <input type="checkbox"/> SHRUB OR OLD FIELD [2]                      | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] | <input type="checkbox"/> MINING/CONSTRUCTION [0] | <input checked="" type="checkbox"/> MODERATE [2] |  |
| <input checked="" type="checkbox"/> NARROW 5-10 m [2] | <input checked="" type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] |                                                    |                                                  | <input type="checkbox"/> HEAVY/SEVERE [1]        |  |
| <input type="checkbox"/> VERY NARROW <5 m [1]         | <input type="checkbox"/> FENCED PASTURE [1]                          |                                                    |                                                  |                                                  |  |
| <input type="checkbox"/> NONE [0]                     |                                                                      |                                                    |                                                  |                                                  |  |

5

  
Max 10

COMMENTS: \_\_\_\_\_

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                       | MORPHOLOGY (Check 1 or 2 & AVERAGE)                               | CURRENT VELOCITY (Check All That Apply)      |
|--------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------|
| <input type="checkbox"/> >1m [6]                 | <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> EDDIES [1]          |
| <input type="checkbox"/> 0.7-1m [4]              | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> TORRENTIAL [-1]     |
| <input type="checkbox"/> 0.4-0.7m [2]            | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> FAST [1]            |
| <input checked="" type="checkbox"/> 0.2-0.4m [1] |                                                                   | <input type="checkbox"/> MODERATE [1]        |
| <input type="checkbox"/> < 0.2m [POOL=0]         |                                                                   | <input checked="" type="checkbox"/> SLOW [1] |
|                                                  |                                                                   | <input type="checkbox"/> INTERSTITIAL [-1]   |
|                                                  |                                                                   | <input type="checkbox"/> INTERMITTENT [-2]   |
|                                                  |                                                                   | <input type="checkbox"/> VERY FAST [1]       |

4

  
Max 12

COMMENTS: \_\_\_\_\_

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                               | RUN DEPTH                                        | RIFFLE/RUN SUBSTRATE                                                     | RIFFLE/RUN EMBEDDEDNESS                       |
|------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------|
| <input type="checkbox"/> Best Areas >10 cm [2]             | <input type="checkbox"/> MAX > 50 [2]            | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]              | <input type="checkbox"/> NONE [2]             |
| <input checked="" type="checkbox"/> Best Areas 5-10 cm [1] | <input checked="" type="checkbox"/> MAX < 50 [1] | <input checked="" type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input checked="" type="checkbox"/> LOW [1]   |
| <input type="checkbox"/> Best Areas < 5 cm [RIFFLE=0]      |                                                  | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]                | <input type="checkbox"/> MODERATE [0]         |
|                                                            |                                                  |                                                                          | <input type="checkbox"/> EXTENSIVE [-1]       |
|                                                            |                                                  |                                                                          | <input type="checkbox"/> NO RIFFLE [Metric=0] |

4

  
Max 8

10

  
Max 10

COMMENTS: \_\_\_\_\_

6) GRADIENT (ft/mi): 15.9 DRAINAGE AREA (sq.mi.): 1.9  
%POOL: 30 %GLIDE: 20  
%RIFFLE: 20 %RUN: 30

\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open: \_\_\_\_\_

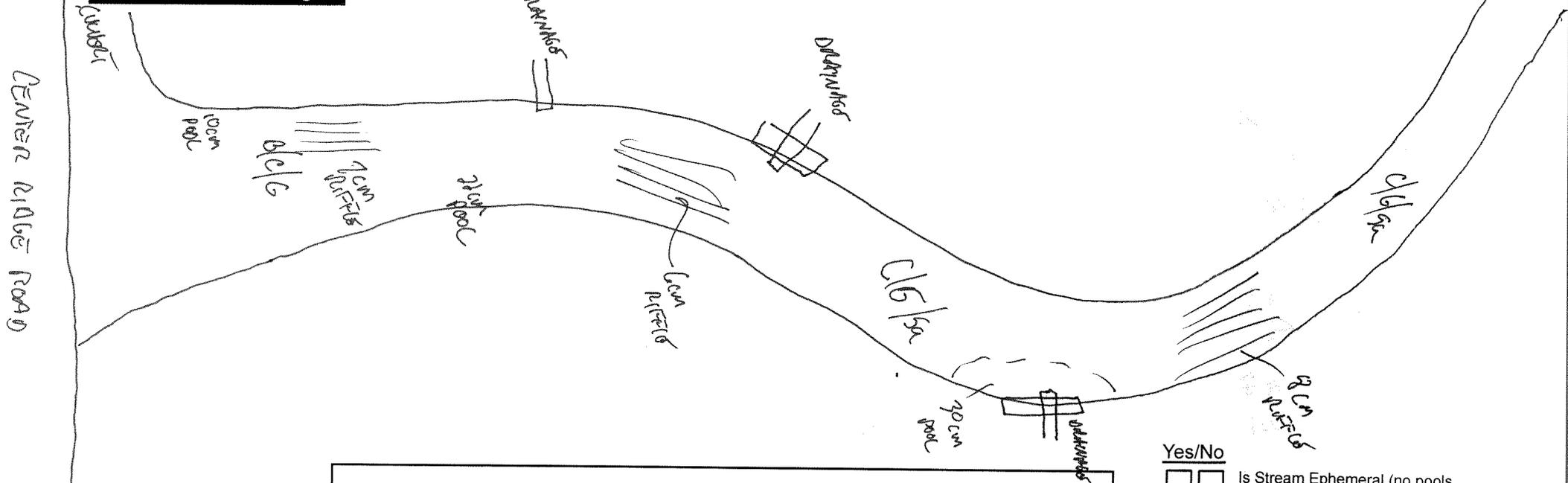
First Sampling Pass \_\_\_\_\_

Gradient:  - Low,  - Moderate,  - High

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|
|               |               |               |                    |                |                |                    |                 |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Mills Creek 3.21  
Stream Segment Location: At Woodland Drive  
QHEI Score: 41 HHEI Score: 65

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FIELD NOTES: 11 SEP 2002

This portion of Mills Creek is located upstream (east) of Woodland Drive. The 5-12' wide, 0-15 cm deep channel has a substrate of gravel, bedrock, clay, cobbles, boulders, and silt. Minnows, frogs, and crayfish were noted in the pools. The narrow wooded buffer on each bank is dominated by sugar maple, black cherry, American basswood, green ash, tulip tree and English ivy.

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PHOTOS:



1) Mills Creek 3.21 – Facing upstream of Woodland Drive



2) Mills Creek 3.21 – Facing downstream of Woodland Drive



Qualitative Habitat Evaluation Index Field Sheet

QHEI Score: 41

River Code: RM: 3.21 Stream: MILLIS CREEK
Date: 9/11/02 Location: AT WOODLAND DRIVE
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
[ ] BLDR /SLBS [10] [ ] GRAVEL [7] 30 30 Check ONE (OR 2 & AVERAGE)
[ ] BOULDER [9] 10 10 [ ] SAND [6] 10 10 [ ] LIMESTONE [1] SILT:
[ ] COBBLE [8] 15 15 [ ] BEDROCK [5] 10 10 [ ] TILLS [1]
[ ] HARDPAN [4] 20 20 [ ] DETRITUS [3] [ ] WETLANDS [0]
[ ] MUCK [2] [ ] ARTIFICIAL [0] [ ] HARDPAN [0]
[ ] SILT [2] 5 5 NOTE: Ignore Sludge Originating From Point Sources
[ ] SANDSTONE [0] EMBEDDED
[ ] RIP/RAP [0] NESS:
[ ] LACUSTRINE [0]
[ ] SHALE [-1]
[ ] COAL FINES [-2]

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)
(Structure) TYPE: Score All That Occur AMOUNT: (Check ONLY One or check 2 and AVERAGE)
1 UNDERCUT BANKS [1] 0 POOLS > 70 cm [2] 0 OXBOWS, BACKWATERS [1]
2 OVERHANGING VEGETATION [1] 0 ROOTWADS [1] 0 AQUATIC MACROPHYTES [1]
2 SHALLOWS (IN SLOW WATER) [1] 2 BOULDERS [1] 1 LOGS OR WOODY DEBRIS [1]
1 ROOTMATS [1] COMMENTS:
Cover Max 20

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER Channel
[ ] HIGH [4] [ ] EXCELLENT [7] [ ] NONE [6] [ ] HIGH [3] [ ] SNAGGING [ ] IMPOUND.
[ ] MODERATE [3] [ ] GOOD [5] [ ] RECOVERED [4] [ ] MODERATE [2] [ ] RELOCATION [ ] ISLANDS
[ ] LOW [2] [ ] FAIR [3] [ ] RECOVERING [3] [ ] LOW [1] [ ] CANOPY REMOVAL [ ] LEVEED
[ ] NONE [1] [ ] POOR [1] [ ] RECENT OR NO RECOVERY [1] [ ] DREDGING [ ] BANK SHAPING
[ ] ONE SIDE CHANNEL MODIFICATIONS

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION Riparian
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)
[ ] WIDE > 50m [4] [ ] FOREST, SWAMP [3] [ ] CONSERVATION TILLAGE [1] [ ] NONE/LITTLE [3]
[ ] MODERATE 10-50m [3] [ ] SHRUB OR OLD FIELD [2] [ ] URBAN OR INDUSTRIAL [0] [ ] MODERATE [2]
[ ] NARROW 5-10 m [2] [ ] RESIDENTIAL, PARK, NEW FIELD [1] [ ] OPEN PASTURE, ROWCROP [0] [ ] HEAVY/SEVERE [1]
[ ] VERY NARROW <5 m [1] [ ] FENCED PASTURE [1] [ ] MINING/CONSTRUCTION [0]
[ ] NONE [0]

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [ POOLS & RIFFLES! ] Pool/Current
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)
[ ] >1m [6] [ ] POOL WIDTH > RIFFLE WIDTH [2] [ ] EDDIES [1] [ ] TORRENTIAL [-1]
[ ] 0.7-1m [4] [ ] POOL WIDTH = RIFFLE WIDTH [1] [ ] FAST [1] [ ] INTERSTITIAL [-1]
[ ] 0.4-0.7m [2] [ ] POOL WIDTH < RIFFLE W. [0] [ ] MODERATE [1] [ ] INTERMITTENT [-2]
[ ] 0.2-0.4m [1] [ ] COMMENTS: [ ] SLOW [1] [ ] VERY FAST [1]
[ ] < 0.2m [POOL=0]

CHECK ONE OR CHECK 2 AND AVERAGE
RIFFLE DEPTH RUN DEPTH RIFFLE/RUN SUBSTRATE RIFFLE/RUN EMBEDDEDNESS Riffle/Run
[ ] Best Areas >10 cm [2] [ ] MAX > 50 [2] [ ] STABLE (e.g., Cobble, Boulder) [2] [ ] NONE [2]
[ ] Best Areas 5-10 cm [1] [ ] MAX < 50 [1] [ ] MOD. STABLE (e.g., Large Gravel) [1] [ ] LOW [1]
[ ] Best Areas < 5 cm [RIFFLE=0] [ ] UNSTABLE (Fine Gravel, Sand) [0] [ ] MODERATE [0]
[ ] COMMENTS: [ ] NO RIFFLE [Metric=0] [ ] EXTENSIVE [-1]
Max 8 Gradient Max 10

6] GRADIENT (ft/mi): 7.6 DRAINAGE AREA (sq.mi.): 1.1 %POOL: 60 %GLIDE: 25
%RIFFLE: 15 %RUN:
\*\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N)\_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:

- Low,  - Moderate,  - High

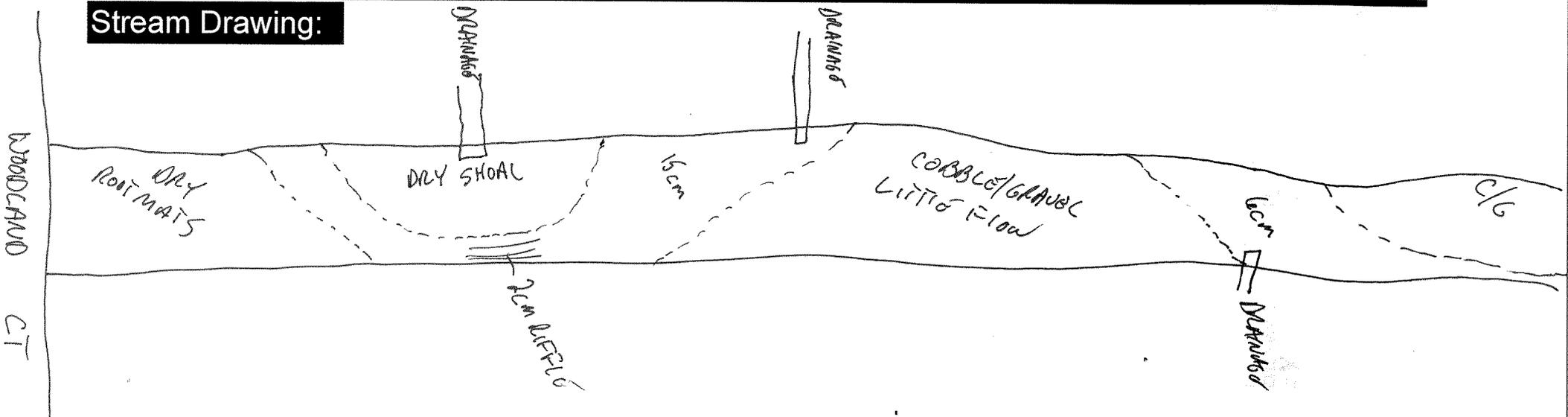
Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open: \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Mean Depth | W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|---------------------|-----------|--------------------|-----------------|-----------------|
|               |               |               |                    |                     |           |                    |                 |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

65

SITE NAME/LOCATION MILLS CREEK AT WOODLAND DRIVE  
 SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 1.0/mi<sup>2</sup>  
 LENGTH OF STREAM REACH (ft) 200 LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 3.21  
 DATE 9/11/07 SCORER SAY MILLER COMMENTS \_\_\_\_\_

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY  
 MODIFICATIONS:

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                         | PERCENT   | TYPE                                                       | PERCENT   |
|--------------------------------------------------------------|-----------|------------------------------------------------------------|-----------|
| <input type="checkbox"/> BLDR SLABS [16 pts]                 |           | <input type="checkbox"/> SILT [3 pt]                       | <u>15</u> |
| <input type="checkbox"/> BOULDER (>256 mm) [16 pts]          | <u>10</u> | <input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts]    |           |
| <input type="checkbox"/> BEDROCK [16 pt]                     | <u>10</u> | <input type="checkbox"/> FINE DETRITUS [3 pts]             |           |
| <input type="checkbox"/> COBBLE (65-256 mm) [12 pts]         | <u>15</u> | <input checked="" type="checkbox"/> CLAY or HARDPAN [0 pt] | <u>20</u> |
| <input checked="" type="checkbox"/> GRAVEL (2-64 mm) [9 pts] | <u>30</u> | <input type="checkbox"/> MUCK [0 pts]                      |           |
| <input type="checkbox"/> SAND (<2 mm) [6 pts]                |           | <input type="checkbox"/> ARTIFICIAL [3 pts]                |           |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 35

(A) 9

(B) 6

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES:

TOTAL NUMBER OF SUBSTRATE TYPES:

HHEI Metric Points

Substrate Max = 40

15

A + B

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                             |                                                            |
|-------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts]          | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]            | <input type="checkbox"/> < 5 cm [5 pts]                    |
| <input checked="" type="checkbox"/> > 10 - 22.5 cm [25 pts] | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS \_\_\_\_\_

MAXIMUM POOL DEPTH (centimeters):

15

Pool Depth Max = 30

25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                              |                                                                     |
|------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                       | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input checked="" type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts] | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts]          |                                                                     |

COMMENTS \_\_\_\_\_

AVERAGE BANKFULL WIDTH (meters)

3.3

Bankfull Width Max=30

25

This information must also be completed

### RIPARIAN ZONE AND FLOODPLAIN QUALITY

☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                      |                                                | FLOODPLAIN QUALITY                  |                                                                             |                          |                                                 |
|-------------------------------------|------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------|--------------------------|-------------------------------------------------|
| L                                   | R                                              | L                                   | R                                                                           | L                        | R                                               |
| <input type="checkbox"/>            | <input type="checkbox"/> (Per Bank) Wide >10m  | <input checked="" type="checkbox"/> | <input type="checkbox"/> (Most Predominant per Bank) Mature Forest, Wetland | <input type="checkbox"/> | <input type="checkbox"/> Conservation Tillage   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Moderate 5-10m        | <input type="checkbox"/>            | <input type="checkbox"/> Immature Forest, Shrub or Old Field                | <input type="checkbox"/> | <input type="checkbox"/> Urban or Industrial    |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> Narrow <5m | <input type="checkbox"/>            | <input checked="" type="checkbox"/> Residential, Park, New Field            | <input type="checkbox"/> | <input type="checkbox"/> Open Pasture, Row Crop |
| <input type="checkbox"/>            | <input type="checkbox"/> None                  | <input type="checkbox"/>            | <input type="checkbox"/> Fenced Pasture                                     | <input type="checkbox"/> | <input type="checkbox"/> Mining or Construction |

COMMENTS \_\_\_\_\_

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):

|                                                                             |                                                                                           |
|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Stream Flowing                                     | <input checked="" type="checkbox"/> Moist Channel, isolated pools, no flow (Intermittent) |
| <input type="checkbox"/> Subsurface flow with isolated pools (Interstitial) | <input type="checkbox"/> Dry channel, no water (Ephemeral)                                |

COMMENTS \_\_\_\_\_

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):

|                                          |                              |                              |                              |
|------------------------------------------|------------------------------|------------------------------|------------------------------|
| <input checked="" type="checkbox"/> None | <input type="checkbox"/> 1.0 | <input type="checkbox"/> 2.0 | <input type="checkbox"/> 3.0 |
| <input type="checkbox"/> 0.5             | <input type="checkbox"/> 1.5 | <input type="checkbox"/> 2.5 | <input type="checkbox"/> >3  |

### STREAM GRADIENT ESTIMATE

Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score 41 (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

WWH Name: FRENCH CREEK Distance from Evaluated Stream 3.2/mi  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: ADON, OH (INSET 3) NRCS Soil Map Page: 3 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LOPAIN Township / City: NORTH RIDGEVILLE

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: \_\_\_\_\_ Quantity: \_\_\_\_\_

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): N Canopy (% open): 65

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_

Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_

Is the sampling reach representative of the stream (Y/N): Y If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: \_\_\_\_\_

**BIOTIC EVALUATION**

Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_

Comments Regarding Biology: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location

FLOW → SEE QHEI FORM

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Mills Creek 3.45  
Stream Segment Location: At Fieldstone Circle  
QHEI Score: 46.5 HHEI Score: 77

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FIELD NOTES: 11 SEP 2002

This portion of Mills Creek is located upstream (southeast) of Fieldstone Circle. The 5-10' wide, 5-15 cm deep portion of the creek has a cobble-boulder dominated substrate with lesser amounts of gravel and sand. A 5-10' wide vegetated buffer separates the creek from the adjacent residential development. Dominant species include multiflora rose, silky dogwood, American elm, Norway maple, staghorn sumac, green ash, tartarian honeysuckle, red oak and black cherry. Minnows were seen in the pools. No restoration potential was noted in this established neighborhood.

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PHOTOS:



1) Mills Creek 3.45 – Mills Creek at Fieldstone Court, facing upstream of bridge



2) Mills Creek 3.45 – Mills Creek at Fieldstone Court, facing downstream of bridge



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **46.5**

River Code: RM: 3.45 Stream: MILLS CREEK  
 Date: 9/11/02 Location: AT FIELDSTONE CIRCLE  
 Scorers Full Name: JAY MILLON Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two SubstrateTYPE BOXES; Estimate % present)

| TYPE                                                                 | POOL RIFFLE                                              | POOL RIFFLE                                      | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                    |
|----------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------|------------------|------------------------------------------------------|
| <input type="checkbox"/> -BLDR /SLBS[10]                             | <input type="checkbox"/> -GRAVEL [7] <u>15</u> <u>15</u> | Check ONE (OR 2 & AVERAGE)                       |                  | Check ONE (OR 2 & AVERAGE)                           |
| <input checked="" type="checkbox"/> -BOULDER [9] <u>20</u> <u>20</u> | <input type="checkbox"/> -SAND [6] <u>10</u> <u>10</u>   | <input type="checkbox"/> -LIMESTONE [1]          | SILT:            | <input type="checkbox"/> - SILT HEAVY [-2]           |
| <input checked="" type="checkbox"/> -COBBLE [8] <u>55</u> <u>55</u>  | <input type="checkbox"/> -BEDROCK[5]                     | <input checked="" type="checkbox"/> -TILLS [1]   |                  | <input type="checkbox"/> -SILT MODERATE [-1]         |
| <input type="checkbox"/> -HARDPAN [4]                                | <input type="checkbox"/> -DETRITUS[3]                    | <input type="checkbox"/> -WETLANDS[0]            |                  | <input checked="" type="checkbox"/> -SILT NORMAL [0] |
| <input type="checkbox"/> -MUCK [2]                                   | <input type="checkbox"/> -ARTIFICIAL[0]                  | <input type="checkbox"/> -HARDPAN [0]            |                  | <input type="checkbox"/> -SILT FREE [1]              |
| <input type="checkbox"/> -SILT [2]                                   | NOTE: Ignore Sludge Originating From Point Sources       | <input type="checkbox"/> -SANDSTONE [0] EMBEDDED |                  | <input type="checkbox"/> -EXTENSIVE [-2]             |
|                                                                      |                                                          | <input type="checkbox"/> -RIP/RAP [0] NESS:      |                  | <input type="checkbox"/> -MODERATE [-1]              |
|                                                                      |                                                          | <input type="checkbox"/> -LACUSTRINE [0]         |                  | <input checked="" type="checkbox"/> -NORMAL [0]      |
|                                                                      |                                                          | <input type="checkbox"/> -SHALE [-1]             |                  | <input type="checkbox"/> -NONE [1]                   |
|                                                                      |                                                          | <input type="checkbox"/> -COAL FINES [-2]        |                  |                                                      |

Substrate  
**20**  
Max 20

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
 (High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS: \_\_\_\_\_  
 2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)  
 (Structure) TYPE: Score All That Occur

AMOUNT: (Check ONLY One or check 2 and AVERAGE)

|                                                  |                             |
|--------------------------------------------------|-----------------------------|
| <input type="checkbox"/> - EXTENSIVE > 75% [11]  | Cover<br><b>5</b><br>Max 20 |
| <input type="checkbox"/> - MODERATE 25-75% [7]   |                             |
| <input type="checkbox"/> - SPARSE 5-25% [3]      |                             |
| <input type="checkbox"/> - NEARLY ABSENT < 5%[1] |                             |

|                                                         |                                              |                                                     |
|---------------------------------------------------------|----------------------------------------------|-----------------------------------------------------|
| <input type="checkbox"/> - UNDERCUT BANKS [1]           | <input type="checkbox"/> - POOLS > 70 cm [2] | <input type="checkbox"/> - OXBOWS, BACKWATERS [1]   |
| <input type="checkbox"/> - OVERHANGING VEGETATION [1]   | <input type="checkbox"/> - ROOTWADS [1]      | <input type="checkbox"/> - AQUATIC MACROPHYTES [1]  |
| <input type="checkbox"/> - SHALLOWS (IN SLOW WATER) [1] | <input type="checkbox"/> - BOULDERS [1]      | <input type="checkbox"/> - LOGS OR WOODY DEBRIS [1] |
| <input type="checkbox"/> - ROOTMATS [1]                 | COMMENTS: _____                              |                                                     |

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                     | DEVELOPMENT                                    | CHANNELIZATION                                       | STABILITY                                      | MODIFICATIONS/OTHER                                       | Channel                        |
|-----------------------------------------------|------------------------------------------------|------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------|--------------------------------|
| <input type="checkbox"/> - HIGH [4]           | <input type="checkbox"/> - EXCELLENT [7]       | <input type="checkbox"/> - NONE [6]                  | <input checked="" type="checkbox"/> - HIGH [3] | <input type="checkbox"/> - SNAGGING                       | Channel<br><b>10</b><br>Max 20 |
| <input type="checkbox"/> - MODERATE [3]       | <input type="checkbox"/> - GOOD [5]            | <input checked="" type="checkbox"/> - RECOVERED [4]  | <input type="checkbox"/> - MODERATE [2]        | <input checked="" type="checkbox"/> - RELOCATION          |                                |
| <input checked="" type="checkbox"/> - LOW [2] | <input type="checkbox"/> - FAIR [3]            | <input type="checkbox"/> - RECOVERING [3]            | <input type="checkbox"/> - LOW [1]             | <input checked="" type="checkbox"/> - CANOPY REMOVAL      |                                |
| <input type="checkbox"/> - NONE [1]           | <input checked="" type="checkbox"/> - POOR [1] | <input type="checkbox"/> - RECENT OR NO RECOVERY [1] |                                                | <input type="checkbox"/> - DREDGING                       |                                |
|                                               |                                                |                                                      |                                                | <input type="checkbox"/> - LEVEED                         |                                |
|                                               |                                                |                                                      |                                                | <input type="checkbox"/> - BANK SHAPING                   |                                |
|                                               |                                                |                                                      |                                                | <input type="checkbox"/> - ONE SIDE CHANNEL MODIFICATIONS |                                |

COMMENTS: \_\_\_\_\_

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

| RIPARIAN WIDTH                                          |                                                                        | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)        |                                                    | BANK EROSION                                          |                                                    | Riparian                           |
|---------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------|----------------------------------------------------|------------------------------------|
| L                                                       | R (Per Bank)                                                           | L                                                    | R (Most Predominant Per Bank)                      | L                                                     | R (Per Bank)                                       | Riparian<br><b>5 1/2</b><br>Max 10 |
| <input type="checkbox"/> - WIDE > 50m [4]               | <input type="checkbox"/> - FOREST, SWAMP [3]                           | <input type="checkbox"/> - CONSERVATION TILLAGE [1]  | <input type="checkbox"/> - URBAN OR INDUSTRIAL [0] | <input checked="" type="checkbox"/> - NONE/LITTLE [3] | <input checked="" type="checkbox"/> - MODERATE [2] |                                    |
| <input type="checkbox"/> - MODERATE 10-50m [3]          | <input type="checkbox"/> - SHRUB OR OLD FIELD [2]                      | <input type="checkbox"/> - OPEN PASTURE, ROWCROP [0] | <input type="checkbox"/> - MINING/CONSTRUCTION [0] | <input type="checkbox"/> - HEAVY/SEVERE [1]           |                                                    |                                    |
| <input checked="" type="checkbox"/> - NARROW 5-10 m [2] | <input checked="" type="checkbox"/> - RESIDENTIAL, PARK, NEW FIELD [1] |                                                      |                                                    |                                                       |                                                    |                                    |
| <input type="checkbox"/> - VERY NARROW <5 m [1]         | <input type="checkbox"/> - FENCED PASTURE [1]                          |                                                      |                                                    |                                                       |                                                    |                                    |
| <input type="checkbox"/> - NONE [0]                     |                                                                        |                                                      |                                                    |                                                       |                                                    |                                    |

COMMENTS: \_\_\_\_\_

5.) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH                                            | MORPHOLOGY                                               | CURRENT VELOCITY ( POOLS & RIFFLES! )   | Pool/Current                       |                                              |
|-------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|------------------------------------|----------------------------------------------|
| (Check 1 ONLY!)                                       | (Check 1 or 2 & AVERAGE)                                 | (Check All That Apply)                  | Pool/Current<br><b>0</b><br>Max 12 |                                              |
| <input type="checkbox"/> - >1m [6]                    | <input type="checkbox"/> - POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> - EDDIES [1]   |                                    | <input type="checkbox"/> - TORRENTIAL [-1]   |
| <input type="checkbox"/> - 0.7-1m [4]                 | <input type="checkbox"/> - POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> - FAST [1]     |                                    | <input type="checkbox"/> - INTERSTITIAL [-1] |
| <input type="checkbox"/> - 0.4-0.7m [2]               | <input type="checkbox"/> - POOL WIDTH < RIFFLE W. [0]    | <input type="checkbox"/> - MODERATE [1] |                                    | <input type="checkbox"/> - INTERMITTENT [-2] |
| <input type="checkbox"/> - 0.2- 0.4m [1]              |                                                          | <input type="checkbox"/> - SLOW [1]     |                                    | <input type="checkbox"/> - VERY FAST [1]     |
| <input checked="" type="checkbox"/> - < 0.2m [POOL=0] | COMMENTS: _____                                          |                                         |                                    |                                              |

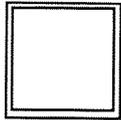
| CHECK ONE OR CHECK 2 AND AVERAGE                                   |                                         |                                                                 |                                           | Riffle/Run                                                        |
|--------------------------------------------------------------------|-----------------------------------------|-----------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------|
| RIFFLE DEPTH                                                       | RUN DEPTH                               | RIFFLE/RUN SUBSTRATE                                            | RIFFLE/RUN EMBEDDEDNESS                   | Riffle/Run<br><b>0</b><br>Max 8<br>Gradient<br><b>6</b><br>Max 10 |
| <input type="checkbox"/> - Best Areas >10 cm [2]                   | <input type="checkbox"/> - MAX > 50 [2] | <input type="checkbox"/> - STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> - NONE [2]       |                                                                   |
| <input type="checkbox"/> - Best Areas 5-10 cm [1]                  | <input type="checkbox"/> - MAX < 50 [1] | <input type="checkbox"/> - MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> - LOW [1]        |                                                                   |
| <input checked="" type="checkbox"/> - Best Areas < 5 cm [RIFFLE=0] |                                         | <input type="checkbox"/> - UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> - MODERATE [0]   |                                                                   |
| COMMENTS: _____                                                    |                                         | <input type="checkbox"/> - NO RIFFLE [Metric=0]                 | <input type="checkbox"/> - EXTENSIVE [-1] |                                                                   |

6) GRADIENT (ft/mi): 7.6 DRAINAGE AREA (sq.mi.): 1.0  
 %POOL: 30 %GLIDE: 55  
 %RIFFLE: 15 %RUN: -

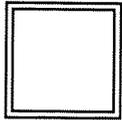
\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_



Subjective Rating (1-10)



Aesthetic Rating (1-10)

Gradient:

- Low,  - Moderate,  - High

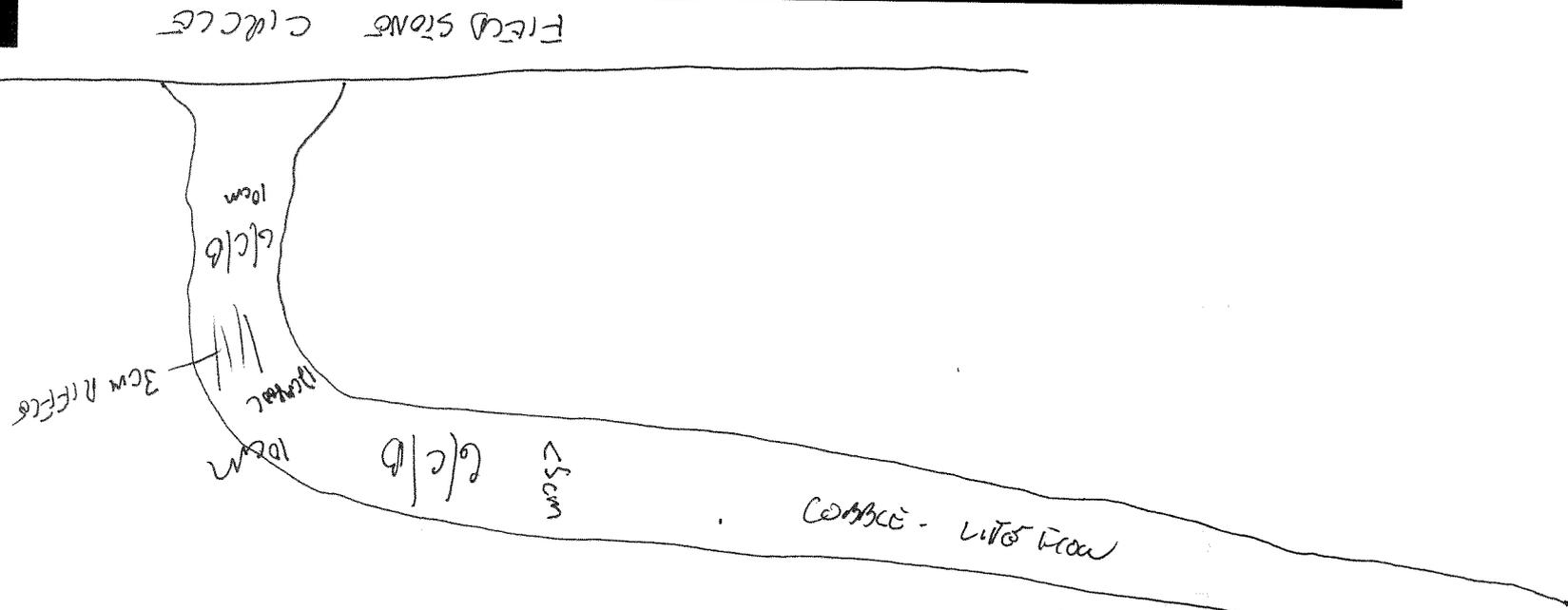
Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Bankfull Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Width | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|----------------|-------------------------|--------------------|-----------------|-----------------|-----------------|
|               |               |               |                    |                |                         |                    |                 |                 |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?



# Primary Headwater Habitat Evaluation Form

HHEI Score (sum of metrics 1, 2, 3) :

77

SITE NAME/LOCATION MILLS CREEK AT FIELDSTONE CIRCLE  
 SITE NUMBER \_\_\_\_\_ RIVER BASIN BLACK RIVER DRAINAGE AREA (mi<sup>2</sup>) 1.0 mi<sup>2</sup>  
 LENGTH OF STREAM REACH (ft) \_\_\_\_\_ LAT. \_\_\_\_\_ LONG. \_\_\_\_\_ RIVER CODE \_\_\_\_\_ RIVER MILE 3.45  
 DATE 9/11/02 SCORER SATY MILLER COMMENTS \_\_\_\_\_

NOTE: Complete All Items On This Form - Refer to "Field Evaluation Manual for Ohio's PWH Streams" for Instructions

STREAM CHANNEL  NONE / NATURAL CHANNEL  RECOVERED  RECOVERING  RECENT OR NO RECOVERY  
 MODIFICATIONS:

1. SUBSTRATE (Estimate percent of every type of substrate present. Check ONLY two predominant substrate TYPE boxes (Max of 32). Add total number of significant substrate types found (Max of 8). Final metric score is sum of boxes A & B.

| TYPE                                                            | PERCENT   | TYPE                                                    | PERCENT |
|-----------------------------------------------------------------|-----------|---------------------------------------------------------|---------|
| <input type="checkbox"/> BLDR SLABS [16 pts]                    |           | <input type="checkbox"/> SILT [3 pt]                    |         |
| <input checked="" type="checkbox"/> BOULDER (>256 mm) [16 pts]  | <u>20</u> | <input type="checkbox"/> LEAF PACK/WOODY DEBRIS [3 pts] |         |
| <input type="checkbox"/> BEDROCK [16 pt]                        |           | <input type="checkbox"/> FINE DETRITUS [3 pts]          |         |
| <input checked="" type="checkbox"/> COBBLE (65-256 mm) [12 pts] | <u>55</u> | <input type="checkbox"/> CLAY or HARDPAN [0 pt]         |         |
| <input type="checkbox"/> GRAVEL (2-64 mm) [9 pts]               | <u>15</u> | <input type="checkbox"/> MUCK [0 pts]                   |         |
| <input type="checkbox"/> SAND (<2 mm) [6 pts]                   | <u>10</u> | <input type="checkbox"/> ARTIFICIAL [3 pts]             |         |

Total of Percentages of Bldr Slabs, Boulder, Cobble, Bedrock 75 (A) 28 (B) 4

SCORE OF TWO MOST PREDOMINATE SUBSTRATE TYPES: TOTAL NUMBER OF SUBSTRATE TYPES:

**HHEI Metric Points**  
 Substrate Max = 40  
32  
 A + B

2. Maximum Pool Depth (Measure the maximum pool depth within the 61 meter (200 ft) evaluation reach at the time of evaluation. Avoid plunge pools from road culverts or storm water pipes) (Check ONLY one box):

|                                                             |                                                            |
|-------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> > 30 centimeters [20 pts]          | <input type="checkbox"/> > 5 cm - 10 cm [15 pts]           |
| <input type="checkbox"/> > 22.5 - 30 cm [30 pts]            | <input type="checkbox"/> < 5 cm [5 pts]                    |
| <input checked="" type="checkbox"/> > 10 - 22.5 cm [25 pts] | <input type="checkbox"/> NO WATER OR MOIST CHANNEL [0 pts] |

COMMENTS \_\_\_\_\_ MAXIMUM POOL DEPTH (centimeters): 12cm

**Pool Depth**  
 Max = 30  
25

3. BANK FULL WIDTH (Measured as the average of 3-4 measurements) (Check ONLY one box):

|                                                                                |                                                                     |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <input type="checkbox"/> > 4.0 meters (> 13') [30 pts]                         | <input type="checkbox"/> > 1.0 m - 1.5 m (> 3' 3" - 4' 8") [15 pts] |
| <input type="checkbox"/> > 3.0 m - 4.0 m (> 9' 7" - 13') [25 pts]              | <input type="checkbox"/> ≤ 1.0 m (≤ 3' 3") [5 pts]                  |
| <input checked="" type="checkbox"/> > 1.5 m - 3.0 m (> 9' 7" - 4' 8") [20 pts] |                                                                     |

COMMENTS \_\_\_\_\_ AVERAGE BANKFULL WIDTH (meters): 2.3m

**Bankfull Width**  
 Max=30  
20

This information must also be completed

RIPARIAN ZONE AND FLOODPLAIN QUALITY ☆NOTE: River Left (L) and Right (R) as looking downstream☆

| RIPARIAN WIDTH                      |                                     | FLOODPLAIN QUALITY                  |                                     |                          |                          |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| L                                   | R                                   | L                                   | R                                   | L                        | R                        |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |

COMMENTS \_\_\_\_\_

FLOW REGIME (At Time of Evaluation) (Check ONLY one box):  
 Stream Flowing  Moist Channel, isolated pools, no flow (Intermittent)  
 Subsurface flow with isolated pools (Interstitial)  Dry channel, no water (Ephemeral)  
 COMMENTS \_\_\_\_\_

SINUOSITY (Number of bends per 61 m (200 ft) of channel) (Check ONLY one box):  
 None  1.0  2.0  3.0  
 0.5  1.5  2.5  >3

STREAM GRADIENT ESTIMATE  Flat (0.5 ft/100 ft)  Flat to Moderate  Moderate (2 ft/100 ft)  Moderate to Severe  Severe (10 ft/100 ft)

**ADDITIONAL STREAM INFORMATION (This Information Must Also be Completed):**

QHEI PERFORMED? -  Yes  No QHEI Score 46.5 (If Yes, Attach Completed QHEI Form)

**DOWNSTREAM DESIGNATED USE(S)**

WWH Name: FRENCH CREEK Distance from Evaluated Stream 3.45 mi  
 CWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_  
 EWH Name: \_\_\_\_\_ Distance from Evaluated Stream \_\_\_\_\_

**MAPPING: ATTACH COPIES OF MAPS, INCLUDING THE ENTIRE WATERSHED AREA. CLEARLY MARK THE SITE LOCATION**

USGS Quadrangle Name: AVON, OH <sup>(INSET C)</sup> NRCS Soil Map Page: 3 NRCS Soil Map Stream Order \_\_\_\_\_  
County: LORAIN Township / City: NORTH RIDGEVILLE

**MISCELLANEOUS**

Base Flow Conditions? (Y/N): Y Date of last precipitation: \_\_\_\_\_ Quantity: \_\_\_\_\_

Photograph Information: \_\_\_\_\_

Elevated Turbidity? (Y/N): N Canopy (% open): 60%

Were samples collected for water chemistry? (Y/N): N (Note lab sample no. or id. and attach results) Lab Number: \_\_\_\_\_

Field Measures: Temp (°C) \_\_\_\_\_ Dissolved Oxygen (mg/l) \_\_\_\_\_ pH (S.U.) \_\_\_\_\_ Conductivity (µmhos/cm) \_\_\_\_\_

Is the sampling reach representative of the stream (Y/N) \_\_\_\_\_ If not, please explain: \_\_\_\_\_

Additional comments/description of pollution impacts: \_\_\_\_\_

**BIOTIC EVALUATION**

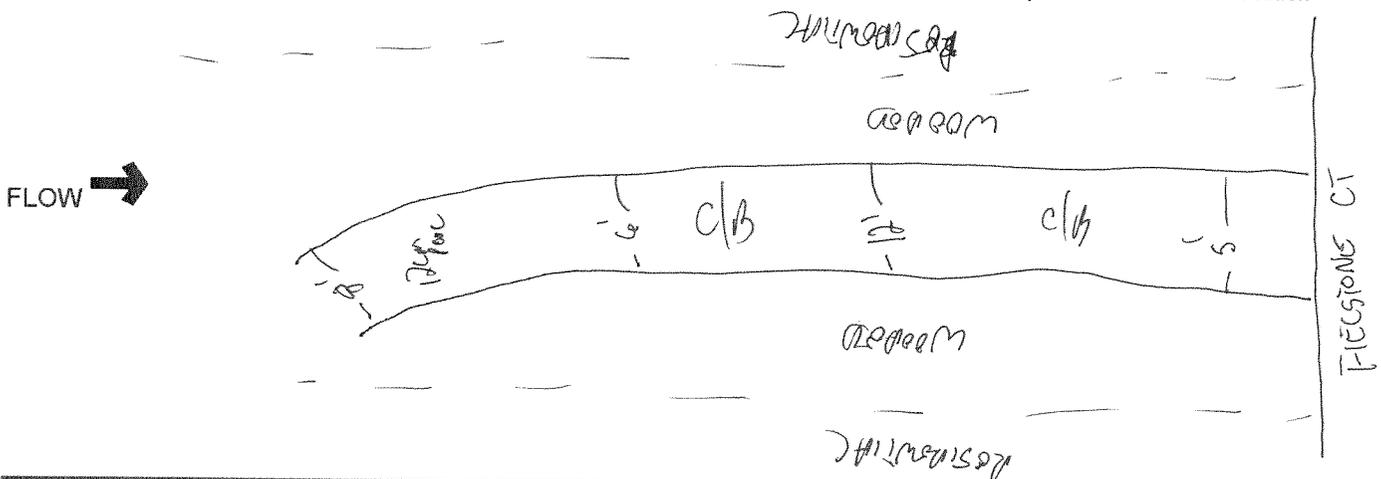
Performed? (Y/N): N (If Yes, Record all observations. Voucher collections optional. NOTE: all voucher samples must be labeled with the site ID number. Include appropriate field data sheets from the Primary Headwater Habitat Assessment Manual)

Fish Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Salamanders Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_  
Frogs or Tadpoles Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_ Aquatic Macroinvertebrates Observed? (Y/N) \_\_\_\_\_ Voucher? (Y/N) \_\_\_\_\_

Comments Regarding Biology: \_\_\_\_\_

**DRAWING AND NARRATIVE DESCRIPTION OF STREAM REACH (This must be completed):**

Include important landmarks and other features of interest for site evaluation and a narrative description of the stream's location



***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Mills Creek 3.79

Stream Segment Location: At Barton Road

QHEI Score: NA

HHEI Score: NA

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FIELD NOTES: 11 SEP 2002

This portion of Mills Creek is located downstream (southwest) of Barton Road. The creek was less than five feet wide, carries little water, is straight with riprap in the channel and surrounded by residential development.

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PHOTOS:



- 1) Mills Creek 3.79 – Mills Creek at Barton Road, facing downstream from road.

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Mills Creek 3.95

Stream Segment Location: At Bradley Road

QHEI Score: NA

HHEI Score: NA

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FIELD NOTES: 11 SEP 2002

This portion of Mills Creek is located downstream (west) of Bradley Road. The channel was dry, less than 5' wide and has a narrow wooded buffer dominated by green ash, pin oak, and red maple.

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PHOTOS:



1) Mills Creek 3.95 – Facing west off of Bradley Road

**FRENCH DITCH NOTES**

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Ditch 0.0  
Stream Segment Location: Mouth of Ditch (French Creek RM 12.85)  
QHEI Score: 50.75 HHEI Score: NA

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FIELD NOTES: 12 SEP 2002

This portion of French Ditch is located near the convergence with French Creek upstream. The gravel and bedrock dominated substrate also contains sand, cobbles, and silt. The 10' wide, 5-10 cm deep channel is straight. Frogs and minnows were noted, along with some algae. The west bank has a wide (>100') forested buffer with species including silver maple, boxelder, multiflora rose, red maple, black cherry, and staghorn sumac. The east bank has a 50' +/- wide herbaceous buffer dominated by Canada goldenrod, reed canary grass, blue grass, boxelder, and thistle. Beyond the sample area there is no buffer on the east bank (residential lawn).

---

PHOTOS:



1) French Ditch 0.0 – Facing upstream at the mouth of French Ditch



2) French Ditch 0.0 – Facing downstream from the end of sample area



3) French Ditch 0.0 – Facing upstream from the end of sample area



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

50 3/4

River Code: RM: 0.0 Stream: FRENCH DITCH

Date: 9-12-02 Location: AT FRENCH CREEK CONFLUENCE (RM 12.85)

Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

Substrate section with checkboxes for BLDR/SLBS, BOULDER, COBBLE, HARDPAN, MUCK, SILT, GRAVEL, SAND, BEDROCK, DETRITUS, ARTIFICIAL, LIMESTONE, TILLS, WETLANDS, HARDPAN, SANDSTONE, RIP/RAP, SHALE, COAL FINES, SILT, SILT HEAVY, SILT MODERATE, SILT NORMAL, SILT FREE, EXTENSIVE, MODERATE, NORMAL, NONE. Includes a score box for 14 1/2.

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >) 4 or More [2] 3 or Less [0]

COMMENTS:

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

Instream Cover section with checkboxes for UNDERCUT BANKS, OVERHANGING VEGETATION, SHALLOWS, ROOTMATS, POOLS, ROOTWADS, BOULDERS, OXBOWS, AQUATIC MACROPHYTES, LOGS OR WOODY DEBRIS. Includes a score box for 9.

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

Channel Morphology section with checkboxes for SINUOSITY, DEVELOPMENT, CHANNELIZATION, STABILITY, MODIFICATIONS/OTHER. Includes a score box for 11.

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream

Riparian Zone and Bank Erosion section with checkboxes for RIPARIAN WIDTH, FLOOD PLAIN QUALITY, BANK EROSION. Includes a score box for 4 1/4.

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

Pool/Glide and Riffle/Run Quality section with checkboxes for MAX. DEPTH, MORPHOLOGY, CURRENT VELOCITY. Includes a score box for 0.

Riffle/Run section with checkboxes for RIFFLE DEPTH, RUN DEPTH, RIFFLE/RUN SUBSTRATE, RIFFLE/RUN EMBEDDEDNESS. Includes a score box for 4.

COMMENTS:

6) GRADIENT (ft/mi): 14.7 DRAINAGE AREA (sq.mi.): 5.2 %POOL: 15 %GLIDE: 55 %RIFFLE: 10 %RUN: 20

\*\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

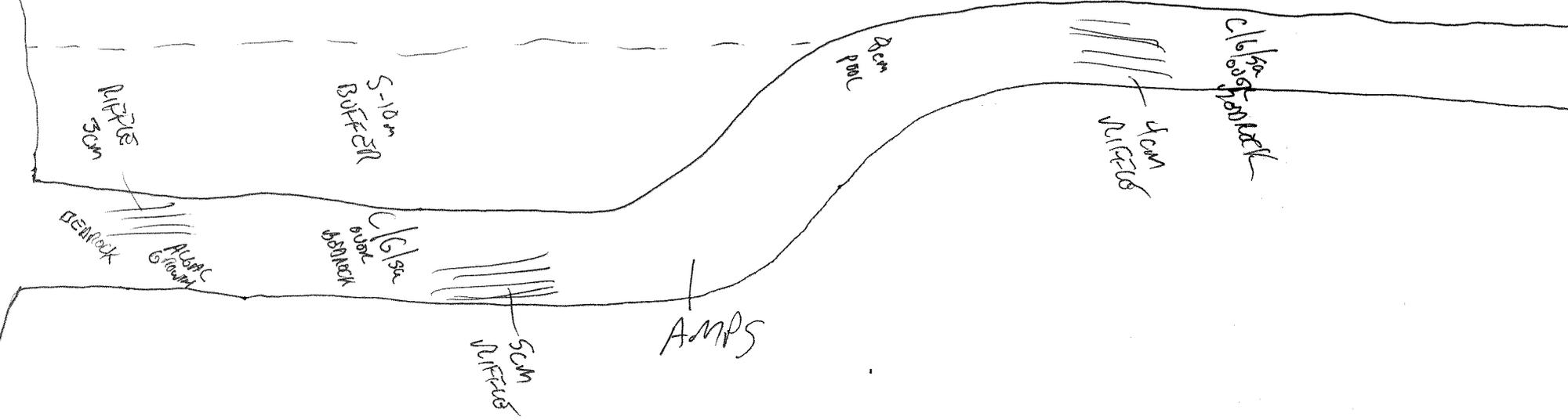
- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

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|-------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------|-----------------|----------------------|---------------------|----------------------|--------------------|-----------------|-----------------|-----------------|
|                                                                                                                   |                         | Gear: _____          | Distance: _____ | Water Clarity: _____ | Water Stage: _____  | Canopy -% Open _____ |                    |                 |                 |                 |
| First Sampling Pass                                                                                               |                         |                      |                 |                      |                     |                      |                    |                 |                 |                 |
| Subjective Rating (1-10)                                                                                          | Aesthetic Rating (1-10) | Stream Measurements: |                 |                      |                     |                      |                    |                 |                 |                 |
| Gradient:<br><input type="checkbox"/> - Low, <input type="checkbox"/> - Moderate, <input type="checkbox"/> - High | Average Width           | Average Depth        | Maximum Depth   | Av. Bankfull Width   | Bankfull Mean Depth | W/D Ratio            | Bankfull Max Depth | Floodprone Area | Entrench. Width | Entrench. Ratio |
|                                                                                                                   |                         |                      |                 |                      |                     |                      |                    |                 |                 |                 |

**Stream Drawing:**

FRENCH CREEK

MAINTAINED LAWN NO BUFFER



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Ditch 0.5  
Stream Segment Location: At Bainbridge Road  
QHEI Score: 40.34 HHEI Score: NA

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FIELD NOTES: 12 SEP 2002

This stretch of French Ditch is located upstream (south) of Bainbridge Road. The gravel and sand dominated substrate contains lesser amounts of cobbles, boulders, and silt. The 6-10' wide, 12 cm deep channel contained minnows. Water milfoil was noted in the channel near the bridge. The east bank has a buffer of Norway spruce along a residential lot. The west bank has a wooded buffer dominated by silver maple and boxelder between the creek and adjacent residential lot.

PHOTOS:



1) French Ditch 0.5 – Facing upstream from bridge at Bainbridge road



2) French Ditch 0.5 – Facing downstream from bridge at Bainbridge road



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

40 3/4

River Code: RM: 0.5 Stream: FRENCH DITCH
Date: 9/12/03 Location: AT BAMBRIDGE ROAD
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
[ ] -BLDR /SLBS [10] [ ] -GRAVEL [7] 40 40 Check ONE (OR 2 & AVERAGE) Check ONE (OR 2 & AVERAGE)
[ ] -BOULDER [9] 5 5 [ ] -SAND [6] 30 30 [ ] -LIMESTONE [1] SILT: [ ] -SILT HEAVY [-2]
[ ] -COBBLE [8] 5 5 [ ] -BEDROCK [5] [ ] -TILLS [1] [ ] -SILT MODERATE [-1] Substrate
[ ] -HARDPAN [4] [ ] -DETRITUS [3] [ ] -WETLANDS [0] [ ] -SILT NORMAL [0]
[ ] -MUCK [2] [ ] -ARTIFICIAL [0] [ ] -HARDPAN [0] [ ] -SILT FREE [1]
[ ] -SILT [2] 20 20 NOTE: Ignore Sludge Originating From Point Sources [ ] -SANDSTONE [0] EMBEDDED [ ] -EXTENSIVE [-2]
[ ] -RIP/RAP [0] NESS: [ ] -MODERATE [-1]
[ ] -LACUSTRINE [0] [ ] -NORMAL [0]
[ ] -SHALE [-1] [ ] -NONE [1]
[ ] -COAL FINES [-2]

NUMBER OF SUBSTRATE TYPES: 4 or More [2]
(High Quality Only, Score 5 or >) 3 or Less [0]
COMMENTS:

2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)
(Structure) TYPE: Score All That Occur AMOUNT: (Check ONLY One or check 2 and AVERAGE) Cover
0 UNDERCUT BANKS [1] 0 POOLS > 70 cm [2] 0 OXBOWS, BACKWATERS [1] [ ] - EXTENSIVE > 75% [11]
2 OVERHANGING VEGETATION [1] 0 ROOTWADS [1] 2 AQUATIC MACROPHYTES [1] [ ] - MODERATE 25-75% [7]
2 SHALLOWS (IN SLOW WATER) [1] 1 BOULDERS [1] 1 LOGS OR WOODY DEBRIS [1] [ ] - SPARSE 5-25% [3]
1 ROOTMATS [1] COMMENTS: [ ] - NEARLY ABSENT < 5% [1]

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER Channel
[ ] - HIGH [4] [ ] - EXCELLENT [7] [ ] - NONE [6] [ ] - HIGH [3] [ ] - SNAGGING [ ] - IMPOUND.
[ ] - MODERATE [3] [ ] - GOOD [5] [ ] - RECOVERED [4] [ ] - MODERATE [2] [ ] - RELOCATION [ ] - ISLANDS
[ ] - LOW [2] [ ] - FAIR [3] [ ] - RECOVERING [3] [ ] - LOW [1] [ ] - CANOPY REMOVAL [ ] - LEVEED
[ ] - NONE [1] [ ] - POOR [1] [ ] - RECENT OR NO RECOVERY [1] [ ] - DREDGING [ ] - BANK SHAPING
[ ] - ONE SIDE CHANNEL MODIFICATIONS

4]. RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) River Right Looking Downstream
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION Riparian
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)
[ ] - WIDE > 50m [4] [ ] - FOREST, SWAMP [3] [ ] - CONSERVATION TILLAGE [1] [ ] - NONE/LITTLE [3]
[ ] - MODERATE 10-50m [3] [ ] - SHRUB OR OLD FIELD [2] [ ] - URBAN OR INDUSTRIAL [0] [ ] - MODERATE [2]
[ ] - NARROW 5-10 m [2] [ ] - RESIDENTIAL, PARK, NEW FIELD [1] [ ] - OPEN PASTURE, ROWCROP [0] [ ] - HEAVY/SEVERE [1]
[ ] - VERY NARROW <5 m [1] [ ] - FENCED PASTURE [1] [ ] - MINING/CONSTRUCTION [0]
[ ] - NONE [0]

5.] POOL/GLIDE AND RIFFLE/RUN QUALITY
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY [ POOLS & RIFFLES! ] Pool/ Current
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)
[ ] - >1m [6] [ ] - POOL WIDTH > RIFFLE WIDTH [2] [ ] - EDDIES [1] [ ] - TORRENTIAL [-1]
[ ] - 0.7-1m [4] [ ] - POOL WIDTH = RIFFLE WIDTH [1] [ ] - FAST [1] [ ] - INTERSTITIAL [-1]
[ ] - 0.4-0.7m [2] [ ] - POOL WIDTH < RIFFLE W. [0] [ ] - MODERATE [1] [ ] - INTERMITTENT [-2]
[ ] - 0.2- 0.4m [1] [ ] - SLOW [1] [ ] - VERY FAST [1]
[ ] - < 0.2m [POOL=0] COMMENTS:

CHECK ONE OR CHECK 2 AND AVERAGE
RIFPLE DEPTH RUN DEPTH RIFPLE/RUN SUBSTRATE RIFPLE/RUN EMBEDDEDNESS Riffle/Run
[ ] - Best Areas >10 cm [2] [ ] - MAX > 50 [2] [ ] - STABLE (e.g., Cobble, Boulder) [2] [ ] - NONE [2]
[ ] - Best Areas 5-10 cm [1] [ ] - MAX < 50 [1] [ ] - MOD. STABLE (e.g., Large Gravel) [1] [ ] - LOW [1]
[ ] - Best Areas < 5 cm [ ] - UNSTABLE (Fine Gravel, Sand) [0] [ ] - MODERATE [0]
[ ] - NONE [0]
[ ] - EXTENSIVE [-1]
[ ] - NO RIFFLE [Metric=0]

6] GRADIENT (ft/mi): 13.2 DRAINAGE AREA (sq.mi.): 5.1
%POOL: 20 %GLIDE: 40
%RIFFLE: 20 %RUN: 20

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

|                                                                                         |                                                                                        |               |                    |                      |                    |                      |
|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------|--------------------|----------------------|--------------------|----------------------|
| <input style="width: 100%; height: 100%;" type="checkbox"/><br>Subjective Rating (1-10) | <input style="width: 100%; height: 100%;" type="checkbox"/><br>Aesthetic Rating (1-10) | Gear: _____   | Distance: _____    | Water Clarity: _____ | Water Stage: _____ | Canopy -% Open _____ |
| First Sampling Pass _____                                                               |                                                                                        |               |                    |                      |                    |                      |
| Stream Measurements:                                                                    |                                                                                        |               |                    |                      |                    |                      |
| Average Width                                                                           | Average Depth                                                                          | Maximum Depth | Av. Bankfull Width | Bankfull Mean Depth  | W/D Ratio          | Bankfull Max Depth   |
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***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Ditch 1.3  
Stream Segment Location: At Chestnut Ridge Road  
QHEI Score: 32.5 HHEI Score: NA

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**FIELD NOTES:** 12 SEP 2002

This stretch of French Ditch is located upstream (south) of Chestnut Ridge Road along the east side of Root Road. The west bank consists of a 50' +/- herbaceous buffer between the creek and Root Road. The east bank is adjacent to a detention pond for the residential development on the south side of Chestnut Ridge Road. The 10-12' wide, 12-25 cm deep channel contained long-leaf pondweed and patches of algae. The gravel and sand dominated substrate also contained silt. The buffer areas contained boxelder, Canada goldenrod, field bindweed, Canada thistle, redtop grass, bluegrass, silky dogwood, raspberry and Queen Anne's lace. Minnows were noted. A culvert discharges water from the detention pond to the east.

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**PHOTOS:**



- 2) French Ditch 1.3 – Facing upstream from Chestnut Ridge Road towards Root Road



2) French Ditch 1.3 – Facing downstream from end of sample area.



Qualitative Habitat Evaluation Index Field Sheet QHEI Score: **32.5**

River Code: RM: 1.3 Stream: FRENCH DITCH  
 Date: 9/12/02 Location: AT CHESTNUT RIDGE ROAD  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                                  | POOL RIFFLE                                                        | POOL RIFFLE                                        | SUBSTRATE ORIGIN | SUBSTRATE QUALITY                                      |
|-------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------|------------------|--------------------------------------------------------|
| <input type="checkbox"/> BLDR /SLBS [10]              | <input checked="" type="checkbox"/> GRAVEL [7] <u>40</u> <u>40</u> | Check ONE (OR 2 & AVERAGE)                         |                  | Check ONE (OR 2 & AVERAGE)                             |
| <input type="checkbox"/> BOULDER [9]                  | <input checked="" type="checkbox"/> SAND [6] <u>40</u> <u>40</u>   | <input type="checkbox"/> LIMESTONE [1]             | SILT:            | <input type="checkbox"/> SILT HEAVY [-2]               |
| <input type="checkbox"/> COBBLE [8]                   | <input type="checkbox"/> BEDROCK [5]                               | <input type="checkbox"/> TILLS [1]                 |                  | <input checked="" type="checkbox"/> SILT MODERATE [-1] |
| <input type="checkbox"/> HARDPAN [4]                  | <input type="checkbox"/> DETRITUS [3]                              | <input type="checkbox"/> WETLANDS [0]              |                  | <input type="checkbox"/> SILT NORMAL [0]               |
| <input type="checkbox"/> MUCK [2]                     | <input type="checkbox"/> ARTIFICIAL [0]                            | <input type="checkbox"/> HARDPAN [0]               |                  | <input type="checkbox"/> SILT FREE [1]                 |
| <input type="checkbox"/> SILT [2] <u>20</u> <u>20</u> | NOTE: Ignore Sludge Originating From Point Sources                 | <input type="checkbox"/> SANDSTONE [0] EMBEDDED    |                  | <input type="checkbox"/> EXTENSIVE [-2]                |
|                                                       |                                                                    | <input type="checkbox"/> RIP/RAP [0] NESS:         |                  | <input checked="" type="checkbox"/> MODERATE [-1]      |
|                                                       |                                                                    | <input checked="" type="checkbox"/> LACUSTRINE [0] |                  | <input type="checkbox"/> NORMAL [0]                    |
|                                                       |                                                                    | <input type="checkbox"/> SHALE [-1]                |                  | <input type="checkbox"/> NONE [1]                      |
|                                                       |                                                                    | <input type="checkbox"/> COAL FINES [-2]           |                  |                                                        |

NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >)  4 or More [2]  3 or Less [0]

COMMENTS: \_\_\_\_\_

Substrate  
**11**  
 Max 20

2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)

| (Structure)                           | TYPE: Score All That Occur | AMOUNT: (Check ONLY One or check 2 and AVERAGE) |
|---------------------------------------|----------------------------|-------------------------------------------------|
| <u>0</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <input type="checkbox"/> EXTENSIVE > 75% [11]   |
| <u>1</u> OVERHANGING VEGETATION [1]   | <u>0</u> ROOTWADS [1]      | <input type="checkbox"/> MODERATE 25-75% [7]    |
| <u>2</u> SHALLOWS (IN SLOW WATER) [1] | <u>0</u> BOULDERS [1]      | <input type="checkbox"/> SPARSE 5-25% [3]       |
| <u>0</u> ROOTMATS [1]                 | COMMENTS: _____            | <input type="checkbox"/> NEARLY ABSENT < 5% [1] |

Cover  
**5**  
 Max 20

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)

| SINUOSITY                                   | DEVELOPMENT                                  | CHANNELIZATION                                                | STABILITY                                   | MODIFICATIONS/OTHER                                     |
|---------------------------------------------|----------------------------------------------|---------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------|
| <input type="checkbox"/> HIGH [4]           | <input type="checkbox"/> EXCELLENT [7]       | <input type="checkbox"/> NONE [6]                             | <input type="checkbox"/> HIGH [3]           | <input type="checkbox"/> SNAGGING                       |
| <input type="checkbox"/> MODERATE [3]       | <input type="checkbox"/> GOOD [5]            | <input type="checkbox"/> RECOVERED [4]                        | <input type="checkbox"/> MODERATE [2]       | <input checked="" type="checkbox"/> RELOCATION          |
| <input checked="" type="checkbox"/> LOW [2] | <input type="checkbox"/> FAIR [3]            | <input type="checkbox"/> RECOVERING [3]                       | <input checked="" type="checkbox"/> LOW [1] | <input checked="" type="checkbox"/> CANOPY REMOVAL      |
| <input type="checkbox"/> NONE [1]           | <input checked="" type="checkbox"/> POOR [1] | <input checked="" type="checkbox"/> RECENT OR NO RECOVERY [1] |                                             | <input type="checkbox"/> DREDGING                       |
|                                             |                                              |                                                               |                                             | <input type="checkbox"/> BANK SHAPING                   |
|                                             |                                              |                                                               |                                             | <input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS |

Channel  
**5**  
 Max 20

4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank) <sup>R</sup> River Right Looking Downstream <sup>L</sup>

| RIPARIAN WIDTH                                            | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)                        | BANK EROSION                                     |
|-----------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------------------|
| L R (Per Bank)                                            | L R (Most Predominant Per Bank)                                      | L R (Per Bank)                                   |
| <input type="checkbox"/> WIDE > 50m [4]                   | <input type="checkbox"/> FOREST, SWAMP [3]                           | <input type="checkbox"/> NONE/LITTLE [3]         |
| <input type="checkbox"/> MODERATE 10-50m [3]              | <input type="checkbox"/> SHRUB OR OLD FIELD [2]                      | <input checked="" type="checkbox"/> MODERATE [2] |
| <input type="checkbox"/> NARROW 5-10 m [2]                | <input checked="" type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] | <input type="checkbox"/> HEAVY/SEVERE [1]        |
| <input checked="" type="checkbox"/> VERY NARROW < 5 m [1] | <input type="checkbox"/> FENCED PASTURE [1]                          | <input type="checkbox"/> MINING/CONSTRUCTION [0] |
| <input type="checkbox"/> NONE [0]                         |                                                                      |                                                  |

COMMENTS: \_\_\_\_\_

Riparian  
**3 1/2**  
 Max 10

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH (Check 1 ONLY!)                          | MORPHOLOGY (Check 1 or 2 & AVERAGE)                    | CURRENT VELOCITY (Check All That Apply)    |
|-----------------------------------------------------|--------------------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> > 1m [6]                   | <input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> EDDIES [1]        |
| <input type="checkbox"/> 0.7-1m [4]                 | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] | <input type="checkbox"/> TORRENTIAL [-1]   |
| <input type="checkbox"/> 0.4-0.7m [2]               | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]    | <input type="checkbox"/> FAST [1]          |
| <input type="checkbox"/> 0.2-0.4m [1]               |                                                        | <input type="checkbox"/> MODERATE [1]      |
| <input checked="" type="checkbox"/> < 0.2m [POOL=0] | COMMENTS: _____                                        | <input type="checkbox"/> INTERMITTENT [-2] |
|                                                     |                                                        | <input type="checkbox"/> SLOW [1]          |
|                                                     |                                                        | <input type="checkbox"/> VERY FAST [1]     |

Pool/Current  
**0**  
 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                                     | RUN DEPTH                             | RIFFLE/RUN SUBSTRATE                                          | RIFFLE/RUN EMBEDDEDNESS                 |
|------------------------------------------------------------------|---------------------------------------|---------------------------------------------------------------|-----------------------------------------|
| <input type="checkbox"/> Best Areas > 10 cm [2]                  | <input type="checkbox"/> MAX > 50 [2] | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> NONE [2]       |
| <input type="checkbox"/> Best Areas 5-10 cm [1]                  | <input type="checkbox"/> MAX < 50 [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> LOW [1]        |
| <input checked="" type="checkbox"/> Best Areas < 5 cm [RIFFLE=0] |                                       | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> MODERATE [0]   |
|                                                                  |                                       |                                                               | <input type="checkbox"/> EXTENSIVE [-1] |
| COMMENTS: _____                                                  |                                       | <input type="checkbox"/> NO RIFFLE [Metric=0]                 |                                         |

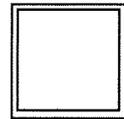
Riffle/Run  
**0**  
 Max 8  
 Gradient  
**8**  
 Max 10

6) GRADIENT (ft/mi): 12.5 DRAINAGE AREA (sq.mi.): 4.7

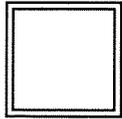
%POOL: 20 %GLIDE: 20  
 %RIFFLE: 30 %RUN: 30

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_



Subjective Rating (1-10)



Aesthetic Rating (1-10)

Gradient:  - Low,  - Moderate,  - High

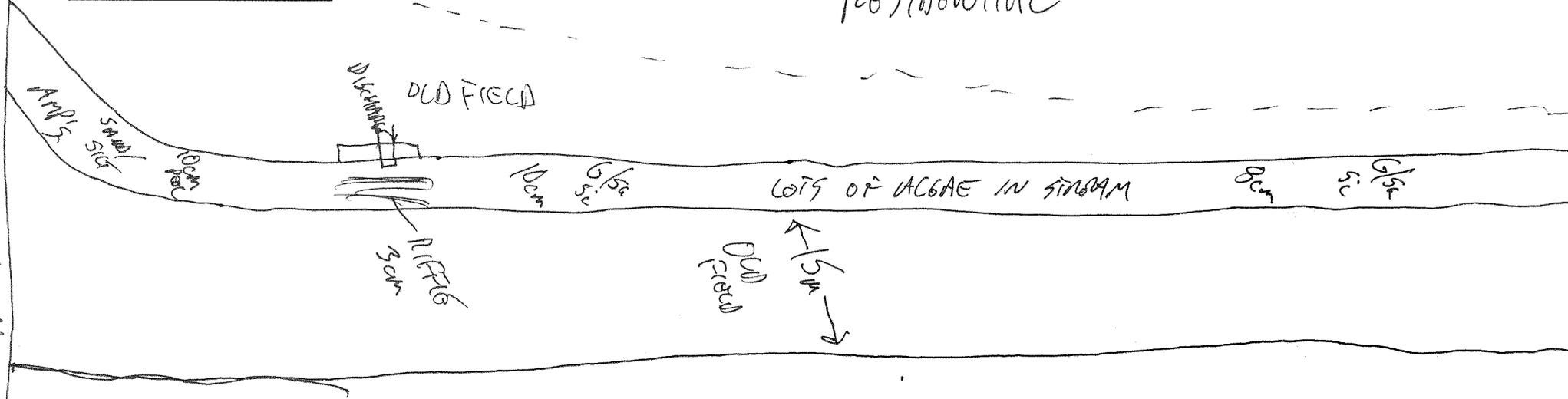
Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

Stream Measurements:

| Average Width | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrench. Ratio |
|---------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-----------------|
|               |               |               |                    |                |                |                    |                 |                 |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: French Ditch 1.93

Stream Segment Location: At Lorain Road

QHEI Score: 57.25

HHEI Score: NA

---

FIELD NOTES: 12 SEP 2002

This portion of French Ditch is located upstream (south) of Lorain Road. The 7-12' wide, 25 cm deep channel has a sand-dominated substrate with lesser amounts of gravel, silt and cobbles. The wide (25- >100') vegetated buffers are dominated by silver maple, Canada goldenrod, riverbank grape, spotted touch-me-not, American elm, green ash, tartarian honeysuckle, black walnut, black nightshade, eastern cottonwood, multiflora rose and common apple. Minnows and tadpoles were noted. Downstream, two culverts have created plunge pools over 1 meter deep. A strong odor of petroleum was noted along the entire stretch, but was strongest at the culvert discharges.

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PHOTOS:



1) French Ditch 1.93 – Facing upstream from bridge at Lorain Road



2) French Ditch 1.93 – Facing downstream from end of sample



Qualitative Habitat Evaluation Index Field Sheet QHEI Score:

57 1/4

River Code: RM: 1.93 Stream: FLOWCH DITCH
Date: 9/12/03 Location: AT LOLAIN ROAD
Scorers Full Name: JAY MILLER Affiliation: USACE - BUFFALO

1] SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)
TYPE POOL RIFFLE POOL RIFFLE SUBSTRATE ORIGIN SUBSTRATE QUALITY
[ ] BLDR /SLBS [10] [ ] GRAVEL [7] 20 25
[ ] BOULDER [9] [ ] SAND [6] 55 50
[ ] COBBLE [8] 10 15 [ ] BEDROCK [5] [ ] LIMESTONE [1] SILT:
[ ] HARDPAN [4] [ ] DETRITUS [3] [ ] TILLS [1]
[ ] MUCK [2] [ ] ARTIFICIAL [0] [ ] WETLANDS [0]
[ ] SILT [2] 15 10 NOTE: Ignore Sludge Originating From Point Sources [ ] SANDSTONE [0] EMBEDDED
[ ] RIP/RAP [0] NESS: [ ] MODERATE [-1]
[ ] 4 or More [2] [ ] LACUSTRINE [0] [ ] NORMAL [0]
[ ] 3 or Less [0] [ ] SHALE [-1] [ ] NONE [1]

COMMENTS:
NUMBER OF SUBSTRATE TYPES: (High Quality Only, Score 5 or >)
2] INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)
(Structure) TYPE: Score All That Occur AMOUNT: (Check ONLY One or check 2 and AVERAGE)
2 UNDERCUT BANKS [1] 1 POOLS > 70 cm [2] 0 OXBOWS, BACKWATERS [1]
2 OVERHANGING VEGETATION [1] 0 ROOTWADS [1] 1 AQUATIC MACROPHYTES [1]
2 SHALLOWS (IN SLOW WATER) [1] 1 BOULDERS [1] 2 LOGS OR WOODY DEBRIS [1]
1 ROOTMATS [1] COMMENTS:
[ ] EXTENSIVE > 75% [11]
[ ] MODERATE 25-75% [7]
[ ] SPARSE 5-25% [3]
[ ] NEARLY ABSENT < 5% [1]

3] CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE)
SINUOSITY DEVELOPMENT CHANNELIZATION STABILITY MODIFICATIONS/OTHER
[ ] HIGH [4] [ ] EXCELLENT [7] [ ] NONE [6] [ ] HIGH [3] [ ] SNAGGING [ ] IMPOUND.
[ ] MODERATE [3] [ ] GOOD [5] [ ] RECOVERED [4] [ ] MODERATE [2] [ ] RELOCATION [ ] ISLANDS
[ ] LOW [2] [ ] FAIR [3] [ ] RECOVERING [3] [ ] LOW [1] [ ] CANOPY REMOVAL [ ] LEVEED
[ ] NONE [1] [ ] POOR [1] [ ] RECENT OR NO RECOVERY [1] [ ] DREDGING [ ] BANK SHAPING
[ ] ONE SIDE CHANNEL MODIFICATIONS

4] RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)
RIPARIAN WIDTH FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN) BANK EROSION
L R (Per Bank) L R (Most Predominant Per Bank) L R L R (Per Bank)
[ ] WIDE > 50m [4] [ ] FOREST, SWAMP [3] [ ] CONSERVATION TILLAGE [1] [ ] NONE/LITTLE [3]
[ ] MODERATE 10-50m [3] [ ] SHRUB OR OLD FIELD [2] [ ] URBAN OR INDUSTRIAL [0] [ ] MODERATE [2]
[ ] NARROW 5-10 m [2] [ ] RESIDENTIAL, PARK, NEW FIELD [1] [ ] OPEN PASTURE, ROWCROP [0] [ ] HEAVY/SEVERE [1]
[ ] VERY NARROW < 5 m [1] [ ] FENCED PASTURE [1] [ ] MINING/CONSTRUCTION [0]
[ ] NONE [0]

5] POOL/GLIDE AND RIFFLE/RUN QUALITY
MAX. DEPTH MORPHOLOGY CURRENT VELOCITY ( POOLS & RIFFLES! )
(Check 1 ONLY!) (Check 1 or 2 & AVERAGE) (Check All That Apply)
[ ] > 1m [6] [ ] POOL WIDTH > RIFFLE WIDTH [2] [ ] EDDIES [1] [ ] TORRENTIAL [-1]
[ ] 0.7-1m [4] [ ] POOL WIDTH = RIFFLE WIDTH [1] [ ] FAST [1] [ ] INTERSTITIAL [-1]
[ ] 0.4-0.7m [2] [ ] POOL WIDTH < RIFFLE W. [0] [ ] MODERATE [1] [ ] INTERMITTENT [-2]
[ ] 0.2-0.4m [1] [ ] COMMENTS: [ ] SLOW [1] [ ] VERY FAST [1]
[ ] < 0.2m [POOL=0]

CHECK ONE OR CHECK 2 AND AVERAGE
RIFPLE DEPTH RUN DEPTH RIFPLE/RUN SUBSTRATE RIFPLE/RUN EMBEDDEDNESS
[ ] Best Areas > 10 cm [2] [ ] MAX > 50 [2] [ ] STABLE (e.g., Cobble, Boulder) [2] [ ] NONE [2]
[ ] Best Areas 5-10 cm [1] [ ] MAX < 50 [1] [ ] MOD. STABLE (e.g., Large Gravel) [1] [ ] LOW [1]
[ ] Best Areas < 5 cm [ ] RIFPLE=0 [ ] UNSTABLE (Fine Gravel, Sand) [0] [ ] MODERATE [0]
[ ] COMMENTS: [ ] NO RIFPLE [Metric=0] [ ] EXTENSIVE [-1]

6] GRADIENT (ft/mi): 11.5 DRAINAGE AREA (sq. mi.): 4.0
% POOL: 35 % GLIDE: 40
% RIFPLE: 15 % RUN: 10

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

Major Suspected Sources of Impacts (Check All That Apply):

- None
- Industrial
- WWTP
- Ag
- Livestock
- Silviculture
- Construction
- Urban Runoff
- CSOs
- Suburban Impacts
- Mining
- Channelization
- Riparian Removal
- Landfills
- Natural Dams
- Other Flow Alteration
- Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

Gradient:

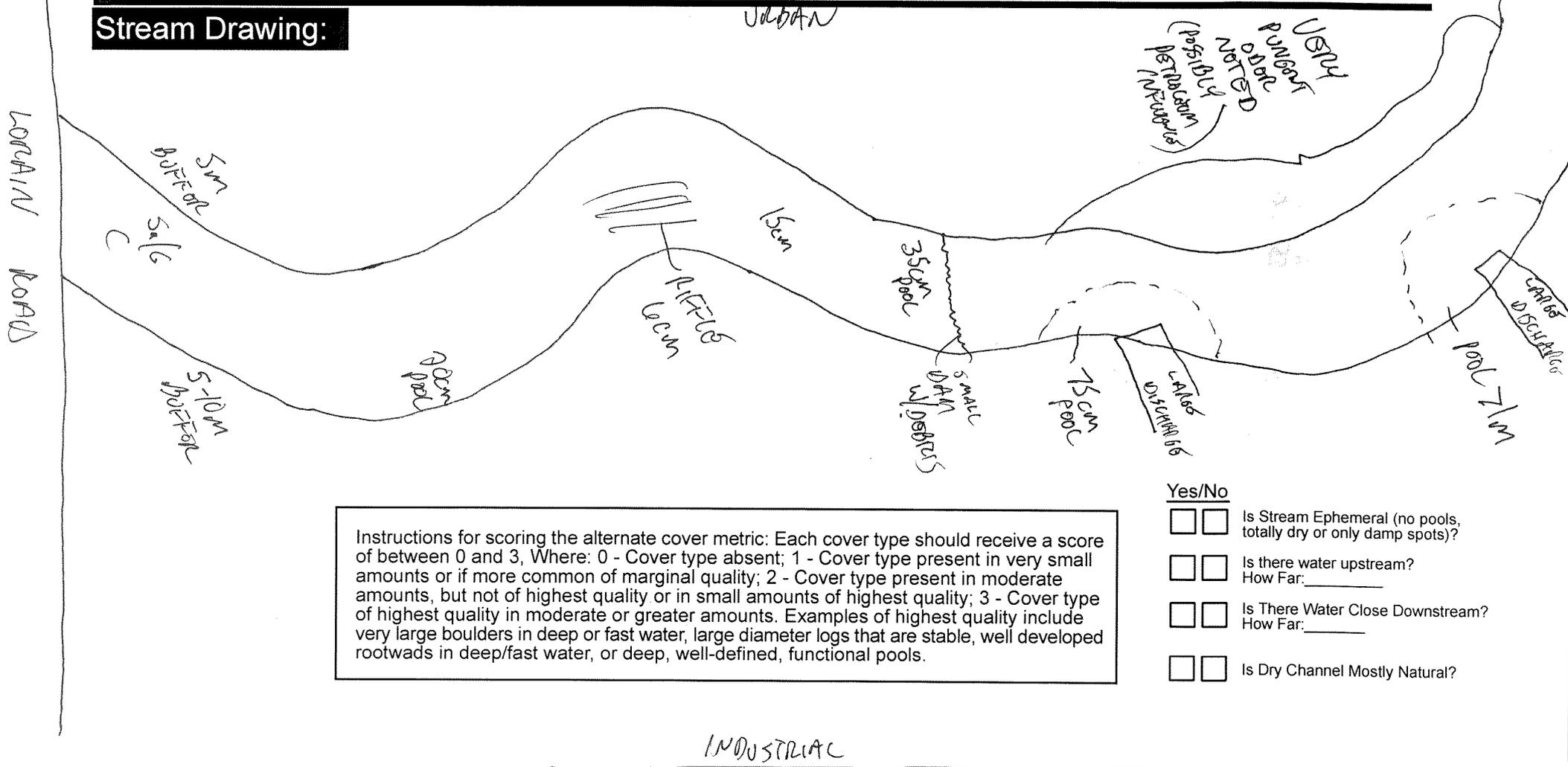
- Low,  - Moderate,  - High

Gear: \_\_\_\_\_ Distance: \_\_\_\_\_ Water Clarity: \_\_\_\_\_ Water Stage: \_\_\_\_\_ Canopy -% Open \_\_\_\_\_

First Sampling Pass \_\_\_\_\_

| Stream Measurements: |               |               |                    |                |                |                    |                 |                    |       |  |  |
|----------------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|--------------------|-------|--|--|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Entrenchment Width | Ratio |  |  |
|                      |               |               |                    |                |                |                    |                 |                    |       |  |  |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

Yes/No

Is Stream Ephemeral (no pools, totally dry or only damp spots)?

Is there water upstream? How Far: \_\_\_\_\_

Is There Water Close Downstream? How Far: \_\_\_\_\_

Is Dry Channel Mostly Natural?

**NAGLE DITCH NOTES**

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Nagle Ditch 0.37

Stream Segment Location: At Boulder Drive

QHEI Score: 32.5

HHEI Score: NA

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FIELD NOTES: 12 SEP 2002

This portion of Nagle Ditch is located upstream (south) of Boulder Drive and is artificially deep from the damming effect of the box culvert under Boulder Drive which was installed much higher than the natural creek bottom. The 15-25' wide, 25-50 cm deep "pool" has a substrate of silt, sand, muck, gravel, cobbles and boulders. The 6-8' high banks that act as a buffer to the adjacent residential development contain boxelder, stinging nettle, silver maple, black walnut, choke cherry, green ash and multiflora rose. Minnows were noted. A rust-colored contamination was observed entering the creek from the west through a 12" PVC pipe.

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PHOTOS:



1) Nagle Ditch 0.37 – Facing upstream from bridge at Boulder Drive



2) Nagle Ditch 0.37 – Discharge pipe entering ditch from the west



3) Nagle Ditch 0.37 – Facing downstream from end of sample



4) Nagle Ditch 0.37 – Bridge culvert under Boulder Drive



5) Nagle Ditch 0.37 – Facing downstream from bridge at Boulder Drive

River Code: RM: 0.37 Stream: NAGLE DITCH  
 Date: 9/12/03 Location: AT BOULDER DRIVE  
 Scorers Full Name: JAY MILLER Affiliation: USACE - BOONEVILLE

1) SUBSTRATE (Check ONLY Two Substrate TYPE BOXES; Estimate % present)

| TYPE                                                   | POOL RIFFLE                                        | POOL RIFFLE                                   | SUBSTRATE ORIGIN                                | SUBSTRATE QUALITY                                   |
|--------------------------------------------------------|----------------------------------------------------|-----------------------------------------------|-------------------------------------------------|-----------------------------------------------------|
| <input type="checkbox"/> B-LDR /SLBS[10]               | <input type="checkbox"/> GRAVEL [7] <u>10</u>      | Check ONE (OR 2 & AVERAGE)                    |                                                 | Check ONE (OR 2 & AVERAGE)                          |
| <input type="checkbox"/> BOULDER [9] <u>5</u>          | <input type="checkbox"/> SAND [6] <u>10</u>        | <input type="checkbox"/> LIMESTONE [1]        | SILT:                                           | <input checked="" type="checkbox"/> SILT HEAVY [-2] |
| <input type="checkbox"/> COBBLE [8] <u>10</u>          | <input type="checkbox"/> BEDROCK[5]                | <input checked="" type="checkbox"/> TILLS [1] |                                                 | <input type="checkbox"/> SILT MODERATE [-1]         |
| <input type="checkbox"/> HARDPAN [4]                   | <input type="checkbox"/> DETRITUS[3]               | <input type="checkbox"/> WETLANDS[0]          |                                                 | <input type="checkbox"/> SILT NORMAL [0]            |
| <input checked="" type="checkbox"/> MUCK [2] <u>30</u> | <input type="checkbox"/> ARTIFICIAL[0]             | <input type="checkbox"/> HARDPAN [0]          |                                                 | <input type="checkbox"/> SILT FREE [1]              |
| <input checked="" type="checkbox"/> SILT [2] <u>35</u> | NOTE: Ignore Sludge Originating From Point Sources |                                               | <input type="checkbox"/> SANDSTONE [0] EMBEDDED | <input checked="" type="checkbox"/> EXTENSIVE [-2]  |
|                                                        |                                                    | <input type="checkbox"/> RIP/RAP [0] NESS:    |                                                 | <input type="checkbox"/> MODERATE [-1]              |
|                                                        |                                                    | <input type="checkbox"/> LACUSTRINE [0]       |                                                 | <input type="checkbox"/> NORMAL [0]                 |
|                                                        |                                                    | <input type="checkbox"/> SHALE [-1]           |                                                 | <input type="checkbox"/> NONE [1]                   |
|                                                        |                                                    | <input type="checkbox"/> COAL FINES [-2]      |                                                 |                                                     |

Substrate  
3  
 Max 20

NUMBER OF SUBSTRATE TYPES:  4 or More [2]  
 (High Quality Only, Score 5 or >)  3 or Less [0]

COMMENTS: Very mucky w/embedded cobbles/boulder/gravel  
 2) INSTREAM COVER (Give each cover type a score of 0 to 3; see back for instructions)  
 (Structure) TYPE: Score All That Occur

AMOUNT: (Check ONLY One or check 2 and AVERAGE)

|                                                 |
|-------------------------------------------------|
| <input type="checkbox"/> EXTENSIVE > 75% [11]   |
| <input type="checkbox"/> MODERATE 25-75% [7]    |
| <input type="checkbox"/> SPARSE 5-25% [3]       |
| <input type="checkbox"/> NEARLY ABSENT < 5% [1] |

Cover  
8  
 Max 20

|                                       |                            |                                   |
|---------------------------------------|----------------------------|-----------------------------------|
| <u>1</u> UNDERCUT BANKS [1]           | <u>0</u> POOLS > 70 cm [2] | <u>0</u> OXBOWS, BACKWATERS [1]   |
| <u>2</u> OVERHANGING VEGETATION [1]   | <u>1</u> ROOTWADS [1]      | <u>0</u> AQUATIC MACROPHYTES [1]  |
| <u>0</u> SHALLOWS (IN SLOW WATER) [1] | <u>1</u> BOULDERS [1]      | <u>1</u> LOGS OR WOODY DEBRIS [1] |
| <u>2</u> ROOTMATS [1]                 | COMMENTS:                  |                                   |

3) CHANNEL MORPHOLOGY: (Check ONLY One PER Category OR check 2 and AVERAGE )

| SINUOSITY                                    | DEVELOPMENT                                  | CHANNELIZATION                                     | STABILITY                                   | MODIFICATIONS/OTHER                                                                |
|----------------------------------------------|----------------------------------------------|----------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------|
| <input type="checkbox"/> HIGH [4]            | <input type="checkbox"/> EXCELLENT [7]       | <input type="checkbox"/> NONE [6]                  | <input type="checkbox"/> HIGH [3]           | <input type="checkbox"/> SNAGGING <input checked="" type="checkbox"/> IMPOUND.     |
| <input type="checkbox"/> MODERATE [3]        | <input type="checkbox"/> GOOD [5]            | <input type="checkbox"/> RECOVERED [4]             | <input type="checkbox"/> MODERATE [2]       | <input checked="" type="checkbox"/> RELOCATION <input type="checkbox"/> ISLANDS    |
| <input type="checkbox"/> LOW [2]             | <input type="checkbox"/> FAIR [3]            | <input checked="" type="checkbox"/> RECOVERING [3] | <input checked="" type="checkbox"/> LOW [1] | <input checked="" type="checkbox"/> CANOPY REMOVAL <input type="checkbox"/> LEVEED |
| <input checked="" type="checkbox"/> NONE [1] | <input checked="" type="checkbox"/> POOR [1] | <input type="checkbox"/> RECENT OR NO RECOVERY [1] |                                             | <input type="checkbox"/> DREDGING <input type="checkbox"/> BANK SHAPING            |
|                                              |                                              |                                                    |                                             | <input type="checkbox"/> ONE SIDE CHANNEL MODIFICATIONS                            |

Channel  
6  
 Max 20

COMMENTS:  
 4) RIPARIAN ZONE AND BANK EROSION (check ONE box per bank or check 2 and AVERAGE per bank)  River Right Looking Downstream

| RIPARIAN WIDTH                                            |                                                                      | FLOOD PLAIN QUALITY (PAST 100 Meter RIPARIAN)      |                                                  | BANK EROSION                                     |                                                                                          |
|-----------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------|--------------------------------------------------|------------------------------------------------------------------------------------------|
| L R (Per Bank)                                            | L R (Most Predominant Per Bank)                                      | L R                                                | L R                                              | L R (Per Bank)                                   |                                                                                          |
| <input type="checkbox"/> WIDE > 50m [4]                   | <input type="checkbox"/> FOREST, SWAMP [3]                           | <input type="checkbox"/> CONSERVATION TILLAGE [1]  | <input type="checkbox"/> URBAN OR INDUSTRIAL [0] | <input type="checkbox"/> NONE/LITTLE [3]         | <span style="border: 1px solid black; padding: 5px; font-size: 24px;">4</span><br>Max 10 |
| <input type="checkbox"/> MODERATE 10-50m [3]              | <input type="checkbox"/> SHRUB OR OLD FIELD [2]                      | <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] | <input type="checkbox"/> MINING/CONSTRUCTION [0] | <input checked="" type="checkbox"/> MODERATE [2] |                                                                                          |
| <input type="checkbox"/> NARROW 5-10 m [2]                | <input checked="" type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] |                                                    |                                                  | <input type="checkbox"/> HEAVY/SEVERE [1]        |                                                                                          |
| <input checked="" type="checkbox"/> VERY NARROW < 5 m [1] | <input type="checkbox"/> FENCED PASTURE [1]                          |                                                    |                                                  |                                                  |                                                                                          |
| <input type="checkbox"/> NONE [0]                         |                                                                      |                                                    |                                                  |                                                  |                                                                                          |

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

| MAX. DEPTH                                       | MORPHOLOGY                                                        | CURRENT VELOCITY [ POOLS & RIFFLES! ]        |                                            |
|--------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------|--------------------------------------------|
| (Check 1 ONLY!)                                  | (Check 1 or 2 & AVERAGE)                                          | (Check All That Apply)                       |                                            |
| <input type="checkbox"/> > 1m [6]                | <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] | <input type="checkbox"/> EDDIES [1]          | <input type="checkbox"/> TORRENTIAL [-1]   |
| <input type="checkbox"/> 0.7-1m [4]              | <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]            | <input type="checkbox"/> FAST [1]            | <input type="checkbox"/> INTERSTITIAL [-1] |
| <input checked="" type="checkbox"/> 0.4-0.7m [2] | <input type="checkbox"/> POOL WIDTH < RIFFLE W. [0]               | <input type="checkbox"/> MODERATE [1]        | <input type="checkbox"/> INTERMITTENT [-2] |
| <input type="checkbox"/> 0.2-0.4m [1]            |                                                                   | <input checked="" type="checkbox"/> SLOW [1] | <input type="checkbox"/> VERY FAST [1]     |
| <input type="checkbox"/> < 0.2m [POOL=0]         | COMMENTS:                                                         |                                              |                                            |

Pool/Current  
5  
 Max 12

CHECK ONE OR CHECK 2 AND AVERAGE

| RIFFLE DEPTH                                    | RUN DEPTH                             | RIFFLE/RUN SUBSTRATE                                          | RIFFLE/RUN EMBEDDEDNESS                 |
|-------------------------------------------------|---------------------------------------|---------------------------------------------------------------|-----------------------------------------|
| <input type="checkbox"/> Best Areas > 10 cm [2] | <input type="checkbox"/> MAX > 50 [2] | <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]   | <input type="checkbox"/> NONE [2]       |
| <input type="checkbox"/> Best Areas 5-10 cm [1] | <input type="checkbox"/> MAX < 50 [1] | <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] | <input type="checkbox"/> LOW [1]        |
| <input type="checkbox"/> Best Areas < 5 cm      |                                       | <input type="checkbox"/> UNSTABLE (Fine Gravel, Sand) [0]     | <input type="checkbox"/> MODERATE [0]   |
| [RIFFLE=0]                                      |                                       |                                                               | <input type="checkbox"/> EXTENSIVE [-1] |

Riffle/Run  
0  
 Max 8

COMMENTS: ALL STAGNANT GLIDE  NO RIFFLE [Metric=0]

Gradient  
8  
 Max 10

6) GRADIENT (ft/mi): 14.3 DRAINAGE AREA (sq.mi.): 2.1  
 %POOL:  %GLIDE:   
 %RIFFLE:  %RUN:

\* Best areas must be large enough to support a population of riffle-obligate species

Is Sampling Reach Representative of the Stream (Y/N) \_\_\_ If Not, Explain:

- Major Suspected Sources of Impacts (Check All That Apply):
- None
  - Industrial
  - WWTP
  - Ag
  - Livestock
  - Silviculture
  - Construction
  - Urban Runoff
  - CSOs
  - Suburban Impacts
  - Mining
  - Channelization
  - Riparian Removal
  - Landfills
  - Natural
  - Dams
  - Other Flow Alteration
  - Other: \_\_\_\_\_

Subjective Rating (1-10)

Aesthetic Rating (1-10)

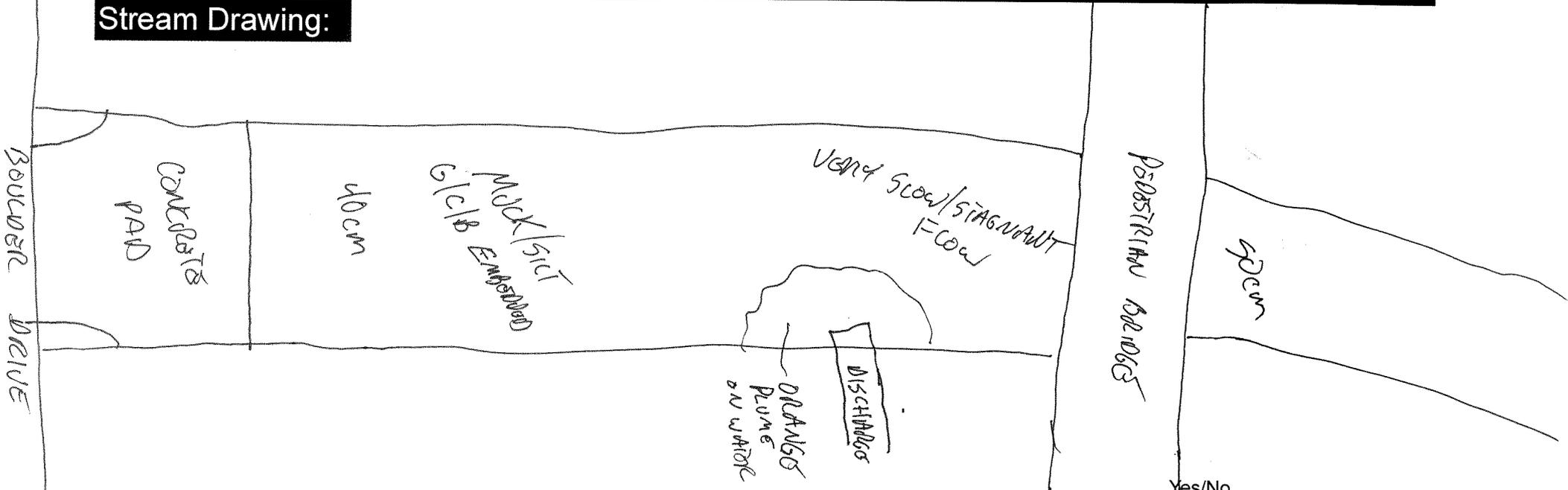
Gradient:

- Low,  - Moderate,  - High

|                     |           |                |              |                |
|---------------------|-----------|----------------|--------------|----------------|
| Gear:               | Distance: | Water Clarity: | Water Stage: | Canopy -% Open |
| First Sampling Pass |           |                |              |                |

| Stream Measurements: |               |               |                    |                |                |                    |                 |       |                 |  |
|----------------------|---------------|---------------|--------------------|----------------|----------------|--------------------|-----------------|-------|-----------------|--|
| Average Width        | Average Depth | Maximum Depth | Av. Bankfull Width | Bankfull Depth | Mean W/D Ratio | Bankfull Max Depth | Floodprone Area | Width | Entrench. Ratio |  |
|                      |               |               |                    |                |                |                    |                 |       |                 |  |

**Stream Drawing:**



Instructions for scoring the alternate cover metric: Each cover type should receive a score of between 0 and 3, Where: 0 - Cover type absent; 1 - Cover type present in very small amounts or if more common of marginal quality; 2 - Cover type present in moderate amounts, but not of highest quality or in small amounts of highest quality; 3 - Cover type of highest quality in moderate or greater amounts. Examples of highest quality include very large boulders in deep or fast water, large diameter logs that are stable, well developed rootwads in deep/fast water, or deep, well-defined, functional pools.

- Yes/No
- Is Stream Ephemeral (no pools, totally dry or only damp spots)?
  - Is there water upstream? How Far: \_\_\_\_\_
  - Is There Water Close Downstream? How Far: \_\_\_\_\_
  - Is Dry Channel Mostly Natural?

***U.S. ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT  
FRENCH CREEK WATERSHED SURVEY***

**FIELD NOTES AND PHOTOS**

Stream Name and River Mile: Nagle Ditch 0.65  
Stream Segment Location: At Lear-Nagle Road  
QHEI Score: 32.5 HHEI Score: NA

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FIELD NOTES: 12 SEP 2002

This portion of Nagle Ditch is located upstream (east) of Lear-Nagle Road. No data was collected in the dry streambed that appeared to be dominated by cobbles, boulders, gravel and sand. Green ash, staghorn sumac, silky dogwood and gray-stemmed dogwood was noted on the banks.

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PHOTOS:



1) Nagle Ditch 0.65 – Facing upstream from bridge at Lear-Nagle Road