Macroinvertebrate Sampling Required by Ohio EPA Permit Number 3PA00002*FD

December 22, 2006

1. Name of the facility:

   Combined sewer overflows (CSOs) of the Northeast Ohio Regional Sewer District (NEORSD).

2. Receiving water of the discharge and subsequent stream network:

   NEORSD CSOs discharge to several water bodies. This report pertains to macroinvertebrate sampling required under Ohio EPA Permit No. 3PA00002*FD. Sampling was conducted on Big Creek, Doan Brook, Euclid Creek, and Mill Creek. Doan Brook and Euclid Creek are tributary to Lake Erie. Big Creek and Mill Creek are tributary to the Cuyahoga River and ultimately to Lake Erie.

3. Description of the facility:

   Several different types of CSO structures are present within the NEORSD system. The location of each NEORSD CSO is listed in Ohio EPA Permit No. 3PA00002*FD. Diagrams and any other descriptive information pertaining to each CSO are on file at the NEORSD Planning Department.

4. Characterization of the effluent from the facility:

   NEORSD CSO effluent data were reported to Ohio EPA in monthly Combined Sewer Overflow Reports from November 1988 through March 1997.

5. Descriptions of all sampling sites in the study area:

   Ohio EPA Permit No. 3PA00002*FD states that macroinvertebrate sampling shall be conducted at the mouths of Mill Creek, Big Creek, Doan Brook, and Euclid Creek. For practical purposes, however, sampling was not necessarily conducted at the mouths of these water bodies. This slight alteration of the sites specified in the permit was discussed with and approved by Ohio EPA in 1997. Documentation of this and other minor changes in sampling and reporting procedures are included in Appendix A.

   <u>Big Creek</u>
   Hester-Dendy artificial substrate samplers were installed downstream of all CSOs tributary to Big Creek, at NEORSD stream monitoring Site #25 (N41.4460°/W81.6865°). This site is located approximately 150 meters downstream of Jennings Road. The creek at this location has riffles, a run, and a deep pool. The samplers were located approximately 30 meters downstream of the Treadway Creek outfall, downstream of the last riffle in the area and upstream of a sharp bend in the

creek and a deep pool. The creek is approximately three meters wide at this location with riffle depths generally greater than ten centimeters. The Hester-Dendy samplers were placed in approximately 36 centimeters of water at this location. The stream gradient at Site #25 is estimated to be approximately 18 feet per mile and the creek has a drainage area of approximately 38.6 square miles. The riparian zone in the area is very narrow, and land use is primarily urban and industrial.

Doan Brook

The Doan Brook NEORSD macroinvertebrate sampling site #16.1 (N41.5330°/W81.6296°)is located approximately 50 meters downstream of the furthest downstream CSO discharging to Doan Brook. This site is located within Rockefeller Park, approximately 30 meters downstream of St. Clair Avenue in the channelized section of the brook. Stone walls eight to ten feet in height are present on both sides of the brook from the University Circle area to Interstate 90. Stream width at this location is approximately three meters and Hester-Dendy samplers were placed in approximately 36 centimeters of water. Land use in the area and throughout the Doan Brook watershed is predominantly residential and recreational. The stream gradient at this site was estimated at approximately 14 feet per mile and the stream has a drainage area of approximately 9.5 square miles.

Euclid Creek

The Euclid Creek macroinvertebrate sampling site is located at NEORSD stream monitoring Site #0.5 (N41.5833°/W81.5594°), within the Wildwood Park area of the Cleveland Lakefront State Park. The stream gradient at this site is estimated to be approximately six feet per mile, creating a dry weather velocity that is lower than desired for the colonization of Hester-Dendy artificial substrate samplers. Despite this low flow, the Hester-Dendy artificial substrate samplers were set downstream of all the Euclid Creek CSOs, approximately 200 meters downstream of Lake Shore Boulevard, in a glide area, which was approximately 36 centimeters deep. The creek is approximately 20 meters wide at this location with a narrow riparian zone and a drainage area of approximately 24.2 square miles. Upstream of Lake Shore Boulevard, the creek has been channelized by the U.S. Army Corps of Engineers. Land use within the Euclid Creek watershed is primarily residential and recreational.

Mill Creek

Hester-Dendy artificial substrate samplers were installed downstream of all CSOs tributary to Mill Creek, at NEORSD stream monitoring Site #31 (N41.4178°/W81.6385°). This site is located approximately 200 meters upstream of the confluence with the Cuyahoga River. Hester-Dendy artificial substrate samplers were installed downstream of a riffle approximately 50 feet upstream from the Canal Road Bridge. The samplers were installed in approximately 36 centimeters of water. This site is downstream from all CSO outfalls and tributaries to Mill Creek. At this

location the stream gradient is calculated to be approximately 12 feet per mile, and the creek has a drainage area of approximately 18.1 miles. Land use within the Mill Creek watershed is primarily industrial and residential.

6. Listing of name and model number of all sampling equipment used:

   Hester-Dendy artificial substrate samplers per Ohio EPA specifications; two sizes of cinder blocks (12"x 4"x 2" and 16"x 8" x 8"); assorted lengths of half inch diameter steel rebar; plastic tie wraps; 1000-milliliter cylindrical plastic screw-top containers; 500-micron D-frame aquatic dip net, Turtox Design 73-440, Wildco Catalog number 425-A46; one square foot Surber sampler; serrated fine-point forceps; 50-milliliter snap-cap vials; Hedwin 4-liter Cubitainers #10M4M3; Wildco Model #190-E20 wash bucket (583-micron mesh bottom); YSI 556 MPS multi-meter (dissolved oxygen, specific conductance, pH and temperature).

7. Description of all electrofishing configurations used:

   Not Applicable.

8. Types of boats used:

   Not Applicable.

9. Description of exact methods for demarcation of the sampling zone:

   Investigators identified the Hester-Dendy artificial substrate sampler locations by pacing off the distance from known landmarks and the sample location. The Big Creek site was located midstream, approximately ninety feet downstream of the Treadway Creek outfall; the Doan Brook site was located river left, approximately 100 feet downstream of the St. Clair Avenue Bridge; the Euclid Creek site was located river right, approximately 600 feet downstream of the Lake Shore Boulevard bridge; and the Mill Creek site was located river right, approximately 50 feet upstream of Canal Road. All sample sites were marked with a length of rebar.

10. Diagram of the course followed as each sampling zone was traversed:

    Not Applicable.

11. Description of sample preservation methods:

    The Hester-Dendy artificial substrate samplers were removed from the water and placed into the five-gallon Wildco wash bucket. The individual samplers were

disassembled in this wash bucket. The Hester-Dendy plates were left in the wash bucket while all of the associated hardware was washed into the bucket with water from the stream being sampled and carefully examined before discarding. The remaining contents of the wash bucket, including the Hester-Dendy plates, were then placed into a 1000-milliliter cylindrical, plastic screw-top container and approximately 10 milliliters of 10 percent formalin was added. Qualitative samples were obtained and placed directly into a 50-milliliter snap-cap vial containing approximately 5 milliliters of 10 percent formalin.

12. Listing of all taxonomic keys utilized for specimen identification:

The following taxonomic literature sources were used by EA Engineering, Science and Technology to identify the benthos in the NEORSD's samples from Big Creek, Doan Brook, Mill Creek, and Euclid Creek.

Bednarik, A.F. and W.P. McCafferty. 1979. Biosystematic revision of the genus Stenonema (Ephemeroptera: Heptageniidae). Canadian Bulletins of Fisheries and Aquatic Sciences 201:1-73.

Bode, R.W. 1983. Larvae of North American Eukiefferiella and Tvetenia (Diptera: Chironomidae). New York State Museum Bulletin 452:1-40.

Bolton, M.J. 1998. Guide to the identification of larval Chironomidae (Diptera) in the temperate eastern Nearctic north of Florida. Ohio EPA, Division of Surface Water, Ecological Assessment Section, Columbus, Ohio.

Brown, H.P. 1976. Aquatic dryopoid beetles (Coleoptera) of the United States. Water Pollution Control Series 18050 ELDO4/72. 2nd edition. U.S. Environmental Protection Agency, Cincinnati, OH.

Burch, J.B. 1982. Freshwater snails (Mollusca: Gastropoda) of North America. EPA-600/3-82-026. U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, OH.

Epler, J.H. 1987. Revision of the Nearctic Dicrotendipes Kieffer, 1913 (Diptera: Chironomidae). Evolutionary Monographs No. 9:1-102.

_____. 1995. Identification manual for the larval Chironomidae (Diptera) of Florida. Florida DEP, Division of Water Facilities, Tallahassee, FL.

_____. 2001. Identification manual for the larval Chironomidae (Diptera) of North and South Carolina. North Carolina DENR, Division of Water Quality, Raleigh, NC.

Grodhaus, G. 1987. Endochironomus Kieffer, Tribelos Townes, Synendotendipes new genus, and Endotribelos new genus (Diptera: Chironomidae) of the Nearctic region. Journal of the Kansas Entomological Society 60(2):167-247.

Jezerinac, R.F., G.W. Stocker, and D.C. Tarter. 1995. The crayfishes (Decapoda: Cambaridae) of West Virginia. Bulletin of the Ohio Biological Survey 10(1):1-193.

Klemm, D.J. 1985. Guide to the freshwater Annelida (Polychaeta, naidid, and tubificid Oligochaeta, and Hirudinea) of North America. Kendall/Hunt Publishing Co., Dubuque, IA.

Larson, D.J., Y. Alarie, and R.E. Roughley. 2000. Predaceous Diving Beetles (Coleoptera: Dytiscidae) of the Nearctic Region: with emphasis on the fauna of Canada and Alaska. NRC Research Press, Ottawa, Canada.

Maschwitz, D.E. 1976. Revision of the Nearctic species of the subgenus Polypedilum (Chironomidae: Diptera). Doctoral Dissertation, University of Minnesota.

McCafferty, W.P. and R.D. Waltz. 1990. Revisionary synopsis of the Baetidae (Ephemeroptera) of North and Middle America. Transactions of the American Entomological Society 116(4):769-799.

Merritt, R.W. and K.W. Cummins, eds. 1996. An introduction to the aquatic insects of North America. 3rd edition. Kendall/Hunt Publishing Co., Dubuque, IA.

Morihara, D.K. and W.P. McCafferty. 1979. The Baetis larvae of North America (Ephemeroptera: Baetidae). Transactions of the American Entomological Society 105:139-221.

Needham, J.G. and M.J. Westfall, Jr. 1955. A manual of the dragonflies of North America (Anisoptera) including the Greater Antilles and the provinces of the Mexican border. University of California Press, Berkeley, California.

Pennak, R.W. 1989. Fresh-water invertebrates of the United States. 2nd edition. John Wiley & Sons, New York, NY.

Roback, S.S. 1985. The immature chironomids of the eastern United States VI. Pentaneurini-genus Ablabesmyia. Proceedings of The Academy of Natural Sciences of Philadelphia 137(2):153-212.

Saether, O.A. 1977. Taxonomic studies on Chironomidae: Nanocladius, Pseudochironomus, and the Harnischia complex. Bulletin of the Fisheries Research Board of Canada 196:1-143.

Simpson, K.W. and R.W. Bode. 1980. Common larvae of the Chironomidae (Diptera) from New York State streams and rivers with particular reference to the fauna of artificial substrates. New York State Museum Bulletin 439:1-105.

Smith, D.G. 2001. Pennak's Freshwater Invertebrates of the United States: Porifera to Crustacea, Fourth Edition. John Wiley & Sons, New York, NY.

Westfall, M.J., Jr. and M.L. May. 1996. Damselflies of North America. Scientific Publishers, Gainesville, Florida.

Wiederholm, T., ed. 1983. Chironomidae of the Holarctic region. Keys and diagnoses. Part 1. Larvae. Entomologica Scandinavica Supplement 19:1-457.

Wiggins, G.B. 1996. Larvae of the North American caddisfly genera (Trichoptera). 2nd edition. University of Toronto Press, Toronto, Canada.

13. Location of the reference collection and other sources used to verify identifications:

A reference collection was not necessary for identification of these specimens. However, if a reference collection had been needed to verify any specimens, EA Engineering, Science and Technology maintains a sizable macroinvertebrate voucher collection with over 1800 specimens representing over 700 taxa. If this taxonomic library proved to be insufficient, every reasonable attempt would be made to have the specimen(s) identified or verified by a noted authority.

14. Exact methods used to construct Hester-Dendy samplers or source of purchase:

Hester-Dendy artificial substrate samplers were constructed by ARC Industries, Inc., using eight, three-inch squares of one-eighth inch thick hardboard, twelve one-inch diameter round, one-eighth inch thick plastic washers (spacers), a one-quarter inch eyebolt, and a one-quarter inch nut. A one-quarter inch diameter hole was drilled through the center of each hardboard square. The plates and spacers were arranged on the eyebolt to provide three single spaces, three double spaces, and one triple space. ARC Industries, Inc. is located at 2879 Johnstown Road in Columbus, Ohio.

15. Methods for anchoring Hester-Dendy samplers:

There are two methods used by NEORSD staff to anchor Hester-Dendy samplers. First, five Hester-Dendy artificial substrate samplers are clustered together with plastic tie-wraps. Another plastic tie-wrap is used to secure the cluster of samplers to the top end of the 12" x 4" side of a 12" x 4" x 2" cinder block or to the top end of the 12" x 2" side. If a 16" x 8" x 8" cinder block is used, then the cluster of samplers is

secured to the 16" x 8" side or to the top end of the 16" x 8" side. If the cluster of Hester-Dendy samplers is attached to the 12" x 4", or the 16" x 8", side of the block, a plastic tie-wrap is passed through the hole in the other end of the concrete block and around a length of steel rebar that has been driven into the substrate, as shown in Figure A. If the cluster of Hester-Dendy samplers is attached to the 12" x 2", or the 16" x 8", top end of the concrete block, a length of steel rebar is driven into the substrate through the hole in the concrete block, as shown in Figure B. The latter method is used at sampling sites that are prone to heavy silt deposition to aid in preventing the Hester-Dendy samplers from being buried in the silt.

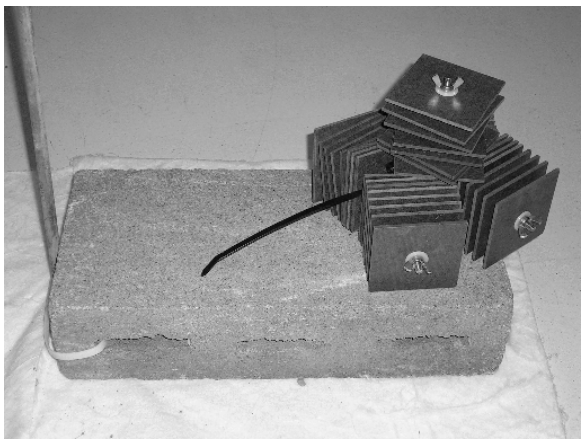


Figure A

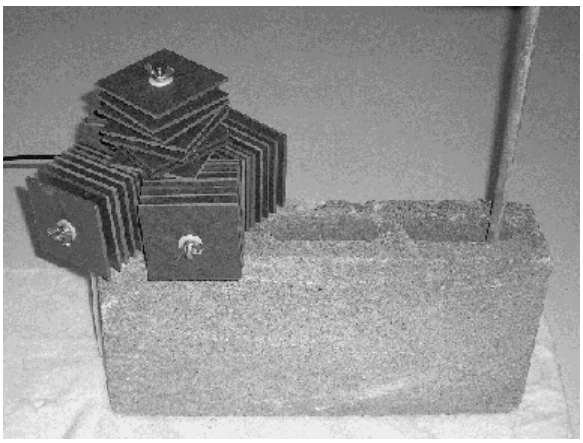


Figure B

16. Descriptions of the methods used to identify dipterans of the family Chironomidae:

Chironomidae larvae were cleared in warm 10% potassium hydroxide and mounted in CMC-10 prior to identification. Generally, 100 chironomids from any single sample are mounted for identification. Species-level identifications generally follow those suggested by Ohio EPA.

17. Copies of all raw data sheets:

Raw data sheets are located in the Appendices at the end of this report as follows:

Appendix B	Chemical Sample Analysis Sheets
Appendix C	Macroinvertebrate Data Sheets

18. Description of the methods used to calculate the QHEI, the IBI, the MIwb, and the ICI for each site:

The QHEI, IBI and the MIwb were not required by Ohio EPA Permit No. 3PA00002*FD.

The Invertebrate Community Index (ICI) was used as the principal measure of overall macroinvertebrate community condition. Developed by the Ohio EPA, the ICI is a modification of the Index of Biotic Integrity for fish (Ohio EPA 1987). The ICI consists of ten individually scored structural community metrics:

1. Total number of taxa
2. Total number of mayfly taxa
3. Total number of caddisfly taxa
4. Total number of dipteran taxa
5. Percent mayflies
6. Percent caddisflies
7. Percent Tanytarsini midges
8. Percent other dipterans and non-insects
9. Percent tolerant organisms
10. Total number of qualitative EPT taxa

Scoring criteria for all ten metrics is dependent upon drainage area. The scoring of an individual sample is based on the relevant attributes of that sample compared to equivalent data from 232 reference sites throughout Ohio. Metric scores range from six points for values comparable to exceptional community structure to zero points for values that deviate strongly from the expected range of values based on scoring criteria established by Ohio EPA (1989a). The sum of the individual metric scores resulted in the ICI score for that particular location.

Calculation of the ICI was conducted using a computer program written for the software SAS® by EA in 1994. This program is continuously tested and updated to ensure its accuracy.

19. Description of qualitative macroinvertebrate sampling techniques:

Qualitative macroinvertebrate sampling was conducted using a 500-micron D-frame aquatic dip net and curved, serrated fine-point forceps. The net was placed in the water with the open end facing upstream. The substrate of all available habitat types (i.e., riffles, runs, deep pools, margins, undercut banks, etc.) was disturbed using kicks with the foot or by hand. Kick sampling and hand picking were conducted until all available habitat types were sampled. The contents of the net were placed into a white enamel pan and sorted for 35 to 45 minutes, until no new or different organisms were found. The organisms were preserved with formalin in sealed containers for future identification.

A Surber sample was utilized when Hester-Dendy samplers were lost or buried. A quadrat (one square foot) was attached to the frame of the collecting net in such a way that it could be placed on the substrate. The substrate within the quadrat was disturbed and current washed the benthic organisms into the net. A total of five quadrats were sampled and composited to create one representative sample. The contents retained were preserved with 10 percent formalin in a sealed container for future identification. As of 2006, if Surber samples were collected in place of a HD

sampler, the ICI score is used for informational purposes only. The ICI score will not be represented graphically or used to determine average ICI scores for individual sites. Furthermore, ICI scores calculated from Surber samples before 2006 are no longer represented graphically.

20. Complete description of any statistical analysis performed on the data:

The only statistical comparison used was the relative abundance (or percent composition) of individual taxa per site and sample type. Relative abundance was calculated for both sample types as:

$$\text{Relative Abundance} = \frac{\text{\# Individuals of a Taxa}}{\text{Total \# of Individuals in a Sample}}$$

21. Dates and Times of Sampling:

Hester-Dendy artificial substrate samplers were installed at all four sites twice during the sampling season. Two macroinvertebrate samplings were conducted at each site in 2006 to evaluate seasonality as a variable. The following table lists the streams, date installed and date removed.

FIRST SAMPLING PERIOD

STREAM	DATE		
	INSTALLED	ADDITIONAL INSTALLATIONS*	REMOVED
EUCLID CREEK	JUNE 15, 2006	JULY 7, 2006 AUGUST 2, 2006	N/A
DOAN BROOK		-	JULY 31, 2006
BIG CREEK		JUNE 30, 2006	AUGUST 11, 2006
MILL CREEK		JUNE 30, 2006	

SECOND SAMPLING PERIOD

STREAM	DATE		
	INSTALLED	ADDITIONAL INSTALLATIONS	REMOVED
EUCLID CREEK	AUGUST 17, 2006 (SURBER SAMPLE)	-	SEPTEMBER 21, 2006
DOAN BROOK	AUGUST 4, 2006		
BIG CREEK	AUGUST 11, 2006		
MILL CREEK			

*Additional installations due to samplers being lost/buried.

22. Results of the stream surveys, in terms of species presence, absence, and relative numbers for each study site.

    A list of taxa collected at each site is included in Appendix C.

23. Discussion of historic data pertaining to the locality of the study sites or that stream segment:

ICI SCORES				
DATE	BIG CREEK	DOAN BROOK	EUCLID CREEK	MILL CREEK
1995	22	--	--	18
1996	20	--	--	--
1997	8	4	8	--
1998	--	16	4	--
1999	16	40	22	32
2000	12	30	10	28
2001	22	8	4	12
July 2002	34*	30	24	28
September 2002	26	33	26	32
August 2003	10*	0*	10*	0
September 2003	16*	22	23	18
July 2004	20*	16	10	16
September 2004	10	12	18	16
July 2005	16	10*	22	28
September/October 2005	20*	16	10	4*

* ICI score obtained using Surber sampler.

<u>Big Creek</u>

NEORSD has conducted quantitative macroinvertebrate sampling near the mouth of Big Creek since 1995. Although there were difficulties with the Hester-Dendy samplers being lost or buried in 1995 and high flows that prevented their timely removal in 1996, the site received an ICI score of 22 in 1995 and of 20 in 1996. In 1997, the site received a "poor" score of 8. It is important to note that, during the 1997 sampling period, a large construction project was taking place approximately one quarter of a mile upstream of the sampling location. This construction site had extensive erosion and runoff, which entered Big Creek through nearby storm sewers. By 1999, the ICI score had improved to 16. In 2000, the ICI score decreased to 12, but it should be noted that the creek again

experienced heavy sediment loadings attributable to a nearby construction project. By 2001, the score had improved to 22, which may reflect the benthic community's recovery from the previous high sediment load. In 2002, Hester-Dendy samplers were installed twice, once in July and once in September. During the July 2002 sampling period, the Hester-Dendy samplers were either lost or buried, so a Surber sample was obtained and an ICI score of 34 was calculated. In September 2002, the site obtained an ICI score of 26. In 2003, Hester-Dendy samplers were also installed twice, one six-week period ending in August and one six-week period ending in September. It is hypothesized that heavy rains during the first sampling period led to the samplers being buried or washed away, and in general, led to the lower scores, at all sites, in 2003. In 2004, the Hester-Dendy samplers were installed twice. For the first period, the Hester-Dendy was not recovered, however a Surber sample score of 20 was calculated. The second 2004 period of Hester-Dendy sampling received a score of 10. Hester-Dendy samplers were installed for two periods during July and September, each for a six-week period, during 2005. The first period of sampling received an ICI score of 16, while a Surber sample was taken for the second period of sampling, due to the Hester-Dendy being lost or buried, resulting in an ICI score of 20. As of September 2004, the general trend of the ICI scores for Big Creek was increasing, which may reflect a recovery period for the benthic community.

Doan Brook

NEORSD has conducted quantitative sampling near the mouth of Doan Brook since 1997. The ICI score calculated in 1997 was 4. The ICI score at this location improved to 16 by 1998. The 1999 ICI score of 40 demonstrated improvement from the previous years. Flow velocities had increased and some upstream discharges were remediated. In 2000, the ICI score near the mouth of Doan Brook was 30. In 2001, the scores had decreased to 8, but, by 2002, the ICI score had improved. In 2002, Hester-Dendy samplers were installed twice, and they were removed in July and September. The scores had improved to 30 and 22, respectively. In 2003, the average score for the two periods that were sampled decreased to 11. The scores from the two 2004 sample periods improved to an average of 14. In 2005, Hester-Dendy samplers were installed twice, once in July and once in September. The July ICI score was 10, based on a Surber sample, while the ICI score for the Hester-Dendy collected in September was 16. Overall, the average score for 2005 was 13, a decrease from the 2004 average of 14.

Euclid Creek

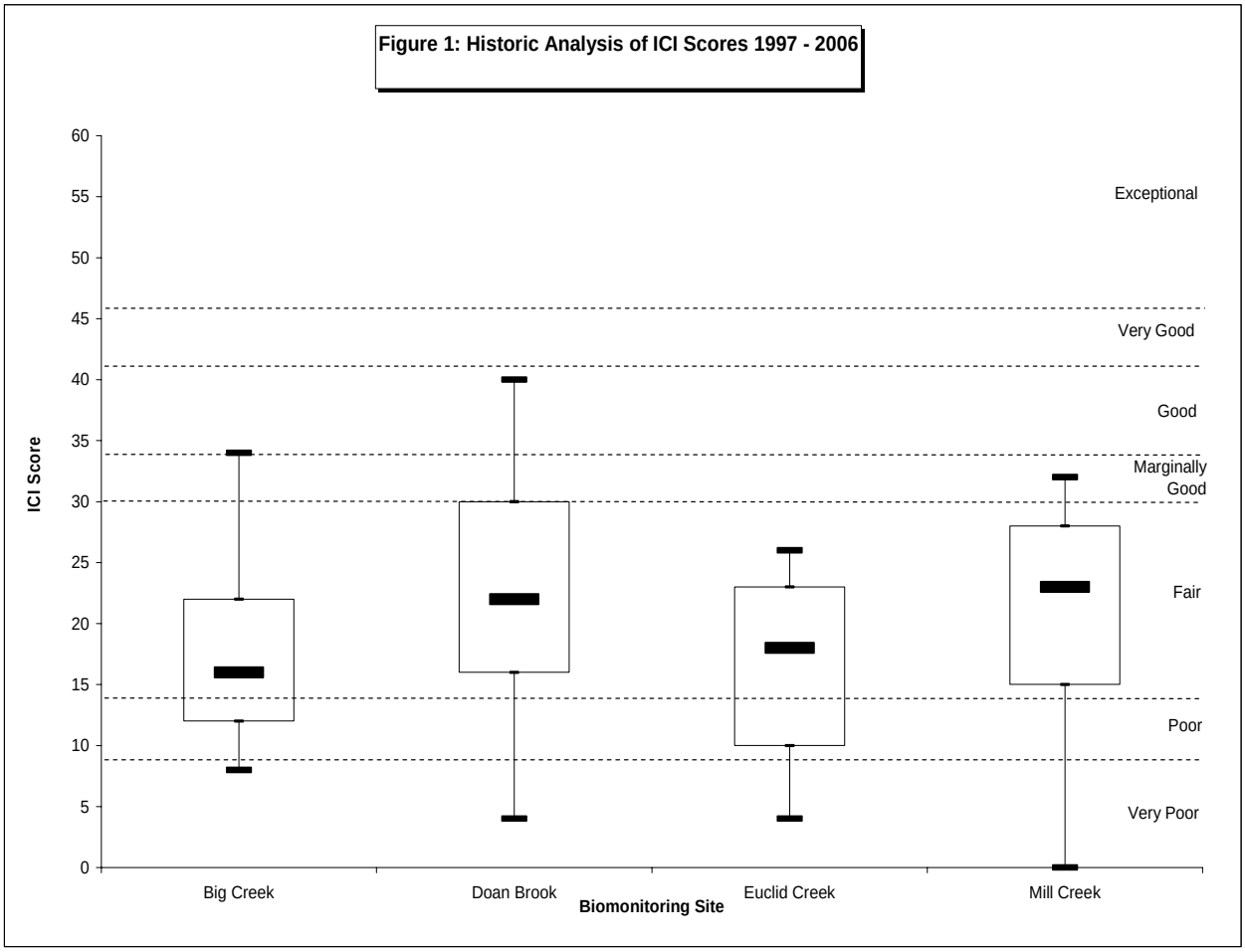
NEORSD conducted quantitative macroinvertebrate sampling near the mouth of Euclid Creek as early as 1991, when a score of 18 was obtained. In 1997, the site was relocated approximately 450 feet downstream of the previous location. At the new location (closer to the mouth), ICI scores of 8 and 4 were obtained in 1997 and 1998, respectively. Low flow observed at the site may have contributed to the poor habitat conditions and low ICI scores. By 1999, the ICI score near the mouth of Euclid Creek had improved to 22. However, in 2000 the score decreased to 10. In 2001, the score had further decreased to

4. By 2002, the Euclid Creek ICI scores had shown an improvement. The Hester-Dendy samplers were installed twice in 2002 and removed in July and September with scores of 24 and 26, respectively. In 2003, the Hester-Dendy samplers were also installed twice. The first sampler was lost or buried and a Surber sample was obtained. This sample received a score of 10. The second sampling period received a score of 23. The first sampling in 2004 received a score of 10. The second Hester-Dendy sampling of 2004 improved to a score of 18. In 2005, Hester Dendy samplers were retrieved in July and September. An ICI score of 22 was obtained in July and in September a score of 10 was obtained. Compared to the average ICI score of 14 in 2004, the average ICI score in 2005 increased to 16.

Mill Creek

NEORSD conducted quantitative macroinvertebrate sampling on Mill Creek, upstream of Canal Road in 1995 and obtained an ICI score of 18. In 1999, an ICI score of 32 at Mill Creek indicated marked improvement since 1995. The ICI score decreased to 28 in 2000. It should be noted that a break in an interceptor sewer had occurred in the spring of 2000, allowing untreated sewage to enter Mill Creek. In 2001, the ICI score had further decreased to 12, suggesting a possible lag time between the break in the interceptor sewer and the effects on the biota of the creek. By 2002, the ICI scores near the mouth of Mill Creek had improved. The Hester-Dendy samplers were installed twice in 2002 and 2003, with average scores of 30 and 9, respectively. In 2004, the average scores increased to 16. Again in 2005, the Hester-Dendy samplers were installed twice, resulting in ICI scores of 28 in July and 4 in October. The ICI score in October was based on a Surber sample, as the Hester-Dendy had been buried in sediment. The average ICI for 2005 therefore remained the same as in 2004, with a score of 16.

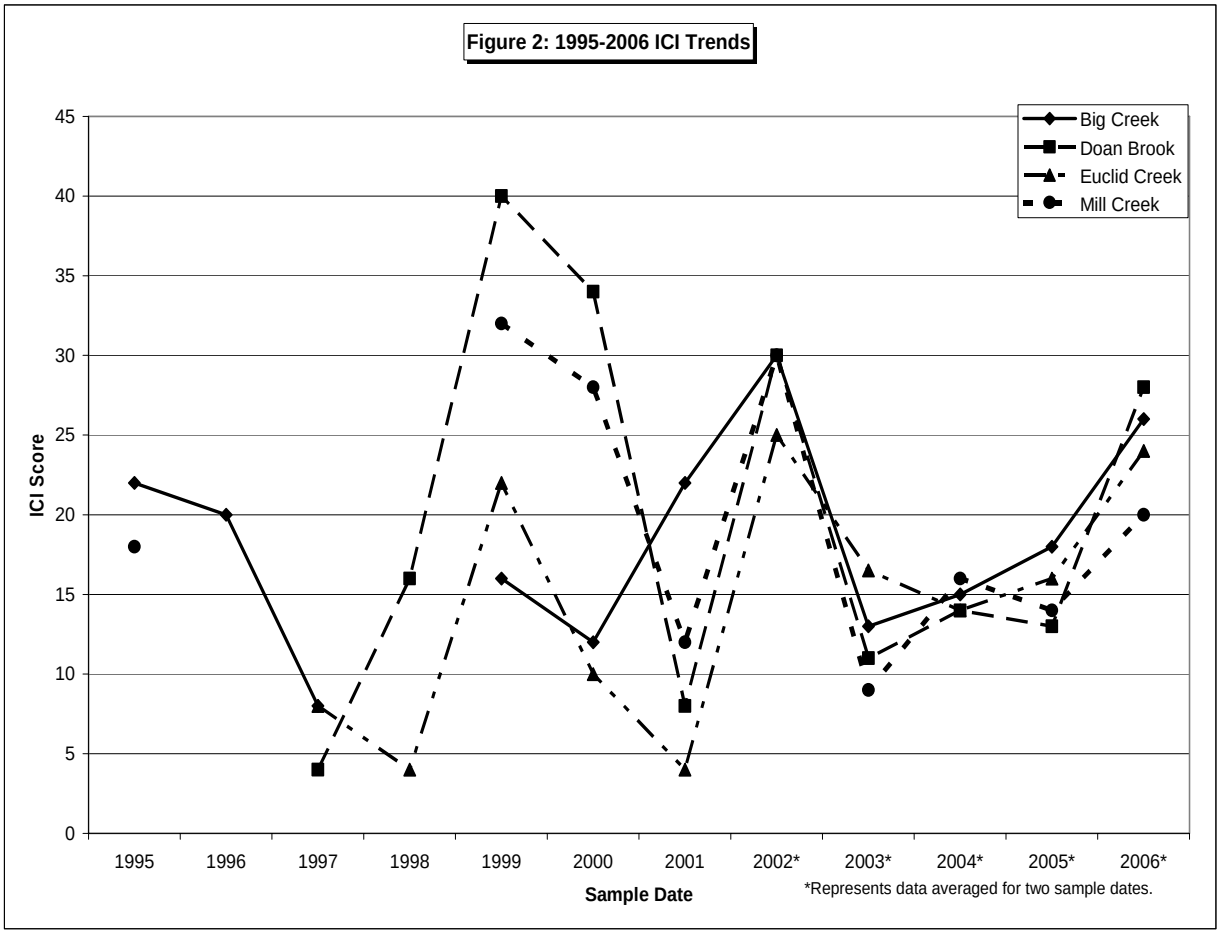
All Sites



ICI scores based on Surber samples have been excluded.

The box-and-whisker plot in Figure 1 provides a comprehensive view of ICI scores for each body of water from 1997 to 2006. This reveals that Doan Brook has experienced the greatest amount of variability in ICI scores since 1997, with the interquartile range falling between 16 and 30. The amount of variability in the individual ICI scores for Big Creek, Euclid Creek and Mill Creek since 1997 is similar The interquartile ranges as well as the maximum and minimum scores, indicate that there has been a great deal of variability at each site over the past ten years.

Analyses of 1995-2006 ICI scores, as shown in Figure 2, reveal considerable fluctuation from year to year for each creek. Figure 2 also suggests that the fluctuation in ICI scores may not be dependent on site-specific changes in water quality, as the scores for each site appear to increase and decrease in unison. The fluctuation of ICI scores may be at least partially dependant on an external factor, such as rainfall, that has a similar effect on each watershed.



ICI scores based on Surber samples have been excluded.

24. The calculated index scores used for comparison with the biological water quality criteria:

Sample Location	July/August 2006 Score	Narrative Rating	September 2006 Score	Narrative Rating	Average 2006 Scores	Narrative Rating
Big Creek	18	Fair	34	Good	26	Fair
Doan Brook	26	Fair	30	Marginally Good	28	Fair
Euclid Creek	8*	Poor	24	Fair	24	Fair
Mill Creek	12	Poor	28	Fair	20	Fair

* Score calculated using Surber sample (not included in average score for 2006).

25. Raw data submitted in computer format:

    The raw data are contained on the enclosed compact disk.

26. The biological criteria used for comparison with the stream sampling data, and the rationale behind the selection of the criteria:

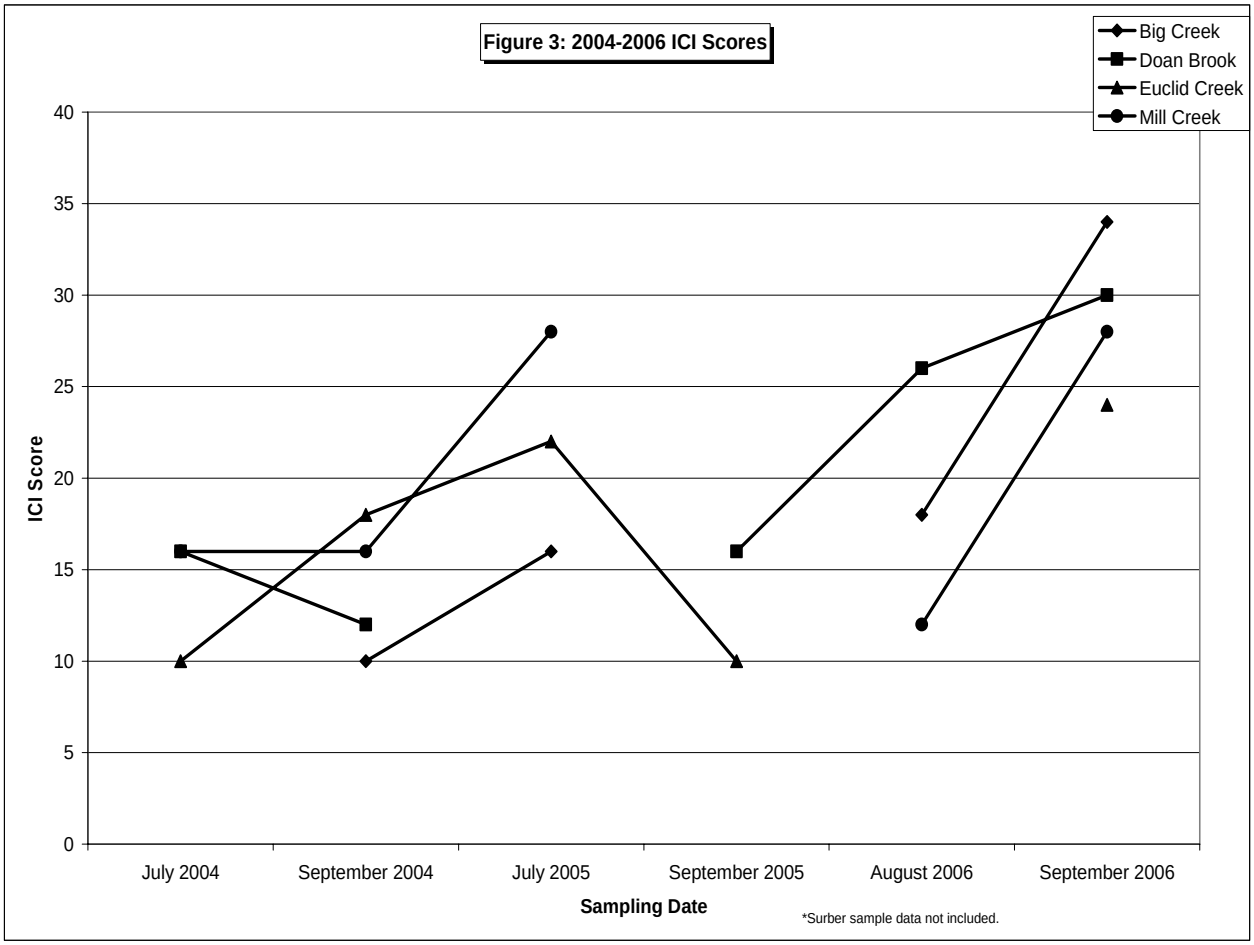
    The stream segments that are required to be sampled for macroinvertebrates per Ohio EPA Permit No. 3PA00002*FD have all been designated Warmwater Habitat for aquatic life use by the Ohio EPA. According to Table 7-15 (Biological Criteria for Warmwater, Exceptional Warmwater and Modified Warmwater Habitats) in OAC 3745-1-07, the ICI criterion for sites that have been designated Warmwater Habitat within the Erie/Ontario Lake Plain ecoregion is 34. The table, however, also indicates that the criteria do not apply to Lake Erie river mouths.

27. The calculated QHEI values:

    Not required by Ohio EPA Permit No. 3PA00002*FD.

28. Discussion of the study results in terms of impact from the facility in question and other facilities that may have been studied:

    Since 2002, NEORSD staff has installed Hester-Dendy samplers for two six-week periods, in an effort to account for seasonal variability. The individual scores for 2006, as well as a calculated average for each site are provided in the table in line item 24. This table demonstrates the variation in ICI scores between the two sampling periods, specifically illustrating that higher scores occurred at all sampling sites in September compared to the scores of the August samples. Figure 3 indicates the amount of variability present between the two sampling periods, from 2004 to 2006. There is clearly a greater degree of seasonal variability between the 2005 and 2006 sampling scores compared to the scores in 2004.



The variability in 2006 scores may be attributed to multiple storm events that occurred during the two sampling periods. A total of 9.25 and 3.62 inches of rainfall was measured at Cleveland Hopkins International Airport by the National Weather Service during the first and second sampling periods, respectively. Forty-six percent (4.23 inches) of the total rainfall during the first sampling period occurred as three storm events between June 19, 2006 and June 22, 2006, beginning four days after Hester-Dendy sampler installation. Lower ICI scores may have occurred due to the effects of the rainfall events, such as scouring and insufficient colonization of the Hester-Dendy samplers, a change in the streambed morphology due to the elevated stream flows and/or the effects of multiple excursions from water quality criteria. A lower ICI score for Big Creek during the first sampling period may also be attributable to sedimentation/embeddedness of the creek substrate caused by bridge reconstruction upstream of Jennings Road. Increased sedimentation/embeddedness of the creek substrate was observed and noted by NEORSD Investigators on August 10, 2006. Water quality samples taken on Big Creek on July 27, 2006 and August 3, 2006, during the two weeks previous to the Hester-Dendy sampler retrieval, indicated

increased total suspended solids and total solids as compared to samples throughout the rest of the sampling period. Higher ICI scores occurred during the second sampling period. This may be due in part to the decrease in rainfall and therefore less sediment runoff from the construction area for the second sampling period. The largest storm event during the second sampling period produced 1.01 inches of rainfall.

There were three documented dry-weather overflows during the two sampling periods. A dry-weather overflow from the Big Creek Pump Station (located on the north side of Memphis Avenue north of Tiedeman Road) was discovered on Big Creek on June 18, 2006, three days after the Hester-Dendy sampler was installed for the first sampling period. This dry-weather overflow was due to a failure of the automated pump station system and was remediated on June 19, 2006 with a correction to the sequence of the pump operation. On August 10, 2006, a dry-weather overflow due to an outlet blockage of the DV-27 regulator (located 100 feet west of the intersection of Parkside Place and Parkgate Avenue) was found on Doan Brook six days after the Hester-Dendy installation for the second sampling period. This dry-weather overflow was corrected on August 10, 2006 by jet rodding and the removal of rags. The third dry-weather overflow was discovered on Mill Creek at the second manhole downstream of the MC-31 regulator (located on East 173rd Street south of Elmer Avenue) on September 8, 2006. The dry-weather overflow occurred during the middle of the second sampling period and was caused by a blockage in the downstream sewage system. This was remediated on September 8, 2006 by obstruction removal.

For the first sampling period, four excursions from applicable outside mixing zone maximum (OMZM) water quality criteria for aquatic life protection occurred on Big Creek, two occurred on Doan Brook, and one occurred on Mill Creek. Three such excursions occurred on Big Creek and one such excursion occurred on Mill Creek during the second sampling period. The excursions on June 22, 2006, July 27, 2006 and September 21, 2006 may be attributable to rainfall events, as the samples were considered wet weather samples. When the average amount of rainfall measured by the National Weather Service at http://www.afws.net/ on a given day is:

- greater than 0.10 inches and rain events began, in general, before 12:00 noon, samples collected that day are considered wet weather samples;
- greater than 0.10 inches but less than 0.25 inches, samples collected the following day are considered wet weather samples;
- greater than 0.25 inches, samples collected the following two days are considered wet weather samples.

Site	Period	Sample Date	Parameter	Value (µg/L)	OMZM Aquatic Life Criterion (µg/L)
Big Creek #25	1st	June 22, 2006	Copper	22	18
		July 27, 2006	Copper	82.6	17
			Cadmium	11.3	5.8
			Zinc	330	140
	2nd	August 3, 2006	Copper	140	40
			Zinc	562	310
			Dissolved Oxygen	3.92 mg/L	4.0 mg/L
Doan Brook #16.1	1st	July 27,2006	Copper	36	11
			Zinc	122	94
Mill Creek #31	1st	July 27, 2006	Copper	27	18
	2nd	August 10, 2006	Dissolved Oxygen	3.63 mg/L	4.0 mg/L

The 30-day outside mixing zone average water quality criterion for the protection of aquatic life for copper was exceeded during the first sampling period on Big Creek. The table below summarizes the individual copper concentrations throughout the 30-day period during which the criterion was exceeded.

	July 27, 2006	August 3, 2006	August 10, 2006	August 17, 2006	August 24, 2006	Average	OMZA
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Copper	82.6	140	12	3.6	4.7	49	19

29. Other relevant information:

All information believed to be relevant has been included.

Appendix A

Correspondence Concerning Minor Changes in Sampling and Reporting Procedures

Northeast Ohio Regional Sewer District

Environmental & Maintenance Services Center • 4747 E. 49th St. • Cuyahoga Heights, OH 44125-1011
(216) 641-6000 • FAX: (216) 641-8118

May 8, 1997

Ms. Sandy Cappotto
Ohio Environmental Protection Agency
Northeast District Office
2110 East Aurora Road
Twinsburg, OH 44087

Dear Ms. Cappotto:

I am writing to confirm our telephone conversation of April 28, 1997 concerning the Northeast Ohio Regional Sewer District's (NEORSD) CSO NPDES Permit No. 3PA00002*FD, effective April 1, 1997.

Part II, Item I of the permit states in part, "The macroinvertebrate sampling required at F.1(d) and G.2 shall be established and conducted in accordance with procedures outlined in 'Reporting and Testing Guidance for Biomonitoring Required by the Ohio Environmental Protection Agency'(October 1991, or latest revision; Division of Surface Water)...." The October 1991 version of "Reporting and Testing Guidance..." is the latest revision.

Section 1, Part B of "Reporting and Testing Guidance..." requires the submission of a Standard Operating Procedure (SOP) which details the techniques used to conduct tests required by NPDES permits. NEORSD will not be required, for the purposes of macroinvertebrate sampling required by NPDES Permit No. 3PA00002*FD, to submit an SOP.

Section 4, Part F of "Reporting and Testing Guidance..." requires the submission of a study plan prior to the initiation of an instream biomonitoring program. NEORSD will not be required, for the purposes of macroinvertebrate sampling required by NPDES Permit No. 3PA00002*FD, to submit a study plan.

Section 4, Part G of "Reporting and Testing Guidance..." requires chemical analysis of ambient waters in conjunction with an instream biological survey. Part G states,

Ms. Sandy Cappotto
Ohio Environmental Protection Agency
May 8, 1997
Page 2

"Parameters analyzed at each site should be relevant to the NPDES permit monitoring requirements and any interactive impacts, including nonpoint sources, that occur in the study area." Ohio EPA will not specify which chemical parameters must be analyzed. NEORSD staff may exercise its discretion in the selection of appropriate chemical parameters.

If I have misinterpreted or misstated our telephone conversation of April 28, 1997, please contact me at the letterhead address or by telephone at (216) 641-6000.

Sincerely,

Frank Foley, Supervisor
Water Quality and Industrial Surveillance

cc J. Weber
R. Connelly
F. Greenland
K. Linn
W. Mack

OhioEPA
State of Ohio Environmental Protection Agency
Northeast District Office
2110 E. Aurora Road
Twinsburg, Ohio 44087-1969
(216) 425-9171
FAX (216) 487-0769

George V. Voinovich
Governor

June 9, 1997

NEORSD
CSO Permit
3PA00002 (OH0043991)

Mr. Frank Greenland
NEO Regional Sewer District
3826 Euclid Ave.
Cleveland, OH 44115

Dear Mr. Greenland:

This letter is to document conversations between Frank Foley, NEORSD and Steve Tuckerman of this office concerning the macroinvertebrate sampling requirement per Part II., I., of the NEORSD CSO permit. The permit as written has conflicting information concerning the dates of deployment of the Hester Dendy artificial substrates (HDs). The dates specified in the permit are in error and all macroinvertebrate sampling should be performed in accordance with "Biological Criteria for the Protection of Aquatic Life: Volume III" which lists June 15 through September 30 as the proper sampling times.

Concern was also expressed about the possible loss of HDs due to natural stream conditions or vandalism. The Ohio EPA recognizes that such situations may occur. All reasonable efforts must be made to collect samples from HDs. If loss of substrates should occur, the District would send a written explanation of why the HDs could not be collected. In any case, qualitative kick net sampling should be performed and the results reported.

The site locations mentioned in the permit are intended as a general location of the sampling area. Final selection of the HD location may be made at the discretion of the NEORSD field staff.

If you have any questions please contact this office at (216) 963-1124 or Steve Tuckerman (216) 963-1105.

Sincerely,
Sandra M. Cappotto
Sandra M. Cappotto
Environmental Scientist
Division of Surface Water

SMC:bp

cc: Frank Foley, NEORSD

file:misc:neorsd:mac

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Appendix C
Macroinvertebrate Data Sheets

2006 ICI Scores

	Big Creek Site #25		Doan Brook Site #16.1		Euclid Creek Site #0.5		Mill Creek Site #31	
	Aug 2006	Sept 2006	July 2006	Sept 2006	Aug 2006	Sept 2006	Aug 2006	Sept 2006
Drainage Area	38.0	38.0	10.0	10.0	23.0	23.0	18.1	18.1
ICI Score	**18**	**34**	**26**	**30**	**8**	**24**	**12**	**28**
Total Number of Organisms	754	388	382	288	48	443	297	424
Number of Taxa	26	25	27	26	12	29	14	24
Taxa Score	4	4	4	4	0	4	2	2
Number of Mayflies	1	2	1	2	0	2	1	2
Mayfly Score	0	0	0	0	0	0	0	0
Number of Caddisflies	2	5	3	3	1	2	1	4
Caddisfly Score	4	6	6	6	2	4	2	6
Number of Dipterans	16	13	18	15	8	16	8	12
Dipteran Score	4	2	4	4	2	4	2	2
Percent Mayflies	13	53.1	8.9	16.3	0	7.2	0.7	5.9
% Mayfly Score	2	6	2	4	0	2	2	2
Percent Caddisflies	3.4	17.3	1.6	3.5	6.3	5.2	3.4	20.5
% Caddisfly Score	2	6	6	6	4	4	4	6
Percent Tanytarsini	4.2	0.5	16.2	11.8	0	14.2	0	0.7
% Tanytarsini Score	2	2	4	4	0	4	0	2
Percent Other Dipterans	79.3	29.1	73.3	68.4	72.9	67.0	96.0	72.6
% Other Dipterans Score	0	4	0	0	0	0	0	0
Percent Tolerant	52.7	7.2	31.7	22.6	41.7	16.0	74.4	5.7
% Tolerant Score	0	4	0	2	0	2	0	6
Qualitative EPT	2	3	2	1	3	3	1	6
EPT Score	0	0	0	0	0	0	0	2
Surber Sample Taken					x			

TAXA COMPOSITION, NUMBER, AND PERCENT OF ORGANISMS COLLECTED IN EACH HESTER-DENDY AND QUALITATIVE SAMPLE AT LOCATION BIG CREEK (BC25), AUGUST AND SEPTEMBER 2006.

TAXA	AUGUST				SEPTEMBER			
	HESTER		QUAL		HESTER		QUAL	
	#	%	#	%	#	%	#	%
Turbellaria	--	--	--	--	--	--	1	2.56
Oligochaeta	153	20.29	5	9.26	6	1.55	4	10.26
Helobdella	1	0.13	--	--	--	--	1	2.56
Helobdella stagnalis	2	0.27	--	--	--	--	--	--
Erpobdella punctata punctata	--	--	3	5.56	2	0.52	1	2.56
Mooreobdella microstoma	11	1.46	1	1.85	--	--	2	5.13
Caecidotea	4	0.53	4	7.41	--	--	4	10.26
Hydracarina	2	0.27	--	--	3	0.77	--	--
Baetis intercalaris	--	--	--	--	10	2.58	--	--
Baetis flavistriga	98	13.00	10	18.52	196	50.52	4	10.26
Calopteryx	--	--	--	--	--	--	5	12.82
Hetaerina	--	--	--	--	--	--	2	5.13
Enallagma	--	--	--	--	--	--	1	2.56
Cheumatopsyche	24	3.18	23	42.59	45	11.60	--	--
Hydropsyche depravata grp.	--	--	--	--	14	3.61	2	5.13
Hydropsyche dicantha	--	--	--	--	4	1.03	--	--
Ceratopsyche morosa	--	--	--	--	2	0.52	2	5.13
Hydroptila	2	0.27	--	--	2	0.52	--	--
Stenelmis	--	--	2	3.70	--	--	--	--
Tanypus	--	--	1	1.85	--	--	--	--
Thienemannimyia grp.	68	9.02	2	3.70	52	13.40	3	7.69
Thienemanniella xena	8	1.06	--	--	--	--	--	--
Cricotopus tremulus grp.	8	1.06	--	--	--	--	--	--
Cricotopus bicinctus grp.	20	2.65	--	--	--	--	--	--
Nanocladius	4	0.53	--	--	--	--	--	--
Nanocladius distinctus	--	--	--	--	4	1.03	--	--
Parametriocnemus	--	--	--	--	2	0.52	--	--
Rheocricotopus robacki	--	--	--	--	4	1.03	--	--
Chironomus	--	--	--	--	2	0.52	--	--
Cryptochironomus	4	0.53	--	--	--	--	--	--
Dicrotendipes simpsoni	8	1.06	--	--	--	--	--	--
Phaenopsectra obediens grp.	--	--	--	--	2	0.52	--	--
Phaenopsectra punctipes grp.	4	0.53	--	--	--	--	--	--
Polypedilum fallax grp.	--	--	--	--	2	0.52	--	--
Polypedilum flavum	56	7.43	1	1.85	2	0.52	--	--
Polypedilum illinoense	216	28.65	--	--	12	3.09	1	2.56
Polypedilum scalaenum grp.	16	2.12	1	1.85	--	--	--	--
Paratanytarsus	20	2.65	--	--	--	--	1	2.56
Rheotanytarsus	8	1.06	--	--	--	--	--	--
Tanytarsus	--	--	--	--	2	0.52	--	--
Tanytarsus glabrescens grp.	4	0.53	--	--	--	--	--	--
Simulium	1	0.13	1	1.85	12	3.09	1	2.56
Tipula	--	--	--	--	1	0.26	--	--
Hemerodromia	4	0.53	--	--	2	0.52	--	--
Physa	8	1.06	--	--	3	0.77	4	10.26
Ferrissia	--	--	--	--	2	0.52	--	--
TOTAL	754	100.00	54	100.00	388	100.00	39	100.00
TOTAL TAXA	26		12		25		17	

TAXA COMPOSITION, NUMBER, AND PERCENT OF ORGANISMS COLLECTED IN EACH HESTER-DENDY AND QUALITATIVE SAMPLE AT LOCATION DOAN BROOK (DB16.1), JULY AND SEPTEMBER 2006.

TAXA	JULY				SEPTEMBER			
	HESTER		QUAL		HESTER		QUAL	
	#	%	#	%	#	%	#	%
Turbellaria	1	0.26	3	12.00	19	6.60	3	17.65
Plumatella	--	--	--	--	1	0.35	--	--
Oligochaeta	98	25.65	1	4.00	7	2.43	--	--
Erpobdella punctata punctata	6	1.57	--	--	1	0.35	--	--
Mooreobdella microstoma	4	1.05	--	--	--	--	1	5.88
Hydracarina	18	4.71	1	4.00	5	1.74	--	--
Baetis intercalaris	--	--	--	--	3	1.04	--	--
Baetis flavistriga	34	8.90	11	44.00	44	15.28	6	35.29
Cheumatopsyche	2	0.52	--	--	2	0.69	--	--
Hydropsyche depravata grp.	3	0.79	6	24.00	7	2.43	--	--
Ceratopsyche morosa	--	--	--	--	1	0.35	--	--
Hydroptila	1	0.26	--	--	--	--	--	--
Thienemannimyia grp.	16	4.19	--	--	32	11.11	1	5.88
Cricotopus tremulus grp.	--	--	--	--	2	0.69	--	--
Nanocladius	9	2.36	--	--	--	--	--	--
Synorthocladius	2	0.52	--	--	4	1.39	--	--
Chironomus	--	--	--	--	4	1.39	--	--
Dicrotendipes simpsoni	7	1.83	--	--	8	2.78	--	--
Endochironomus nigricans	4	1.05	--	--	--	--	--	--
Glyptotendipes	2	0.52	--	--	--	--	--	--
Paratendipes	4	1.05	--	--	--	--	--	--
Phaenopsectra obediens grp.	2	0.52	--	--	10	3.47	--	--
Phaenopsectra punctipes grp.	7	1.83	--	--	8	2.78	--	--
Polypedilum flavum	78	20.42	--	--	30	10.42	--	--
Polypedilum illinoense	16	4.19	--	--	46	15.97	--	--
Polypedilum scalaenum grp.	2	0.52	--	--	2	0.69	1	5.88
Paratanytarsus	49	12.83	--	--	8	2.78	--	--
Rheotanytarsus	7	1.83	--	--	8	2.78	--	--
Tanytarsus	2	0.52	--	--	18	6.25	--	--
Tanytarsus glabrescens grp.	4	1.05	--	--	--	--	--	--
Pericoma	--	--	--	--	--	--	1	5.88
Simulium	2	0.52	1	4.00	7	2.43	3	17.65
Hemerodromia	2	0.52	--	--	10	3.47	--	--
Ephydridae	--	--	1	4.00	--	--	--	--
Physa	--	--	1	4.00	--	--	--	--
Helisoma	--	--	--	--	1	0.35	1	5.88
TOTAL	382	100.00	25	100.00	288	100.00	17	100.00
TOTAL TAXA	27		8		26		8	

TAXA COMPOSITION, NUMBER, AND PERCENT OF ORGANISMS COLLECTED IN EACH SURBER, HESTER-DENDY, AND QUALITATIVE
AT LOCATION EUCLID CREEK (EC0.5), AUGUST AND SEPTEMBER 2006.

	AUGUST				SEPTEMBER			
	SURBER		QUAL		HESTER		QUAL	
TAXA	#_	%_	#_	%_	#_	%_	#_	%_
Turbellaria	--	--	3	5.17	13	2.93	4	10.53
Nemertea	--	--	--	--	2	0.45	--	--
Oligochaeta	5	10.42	4	6.90	49	11.06	2	5.26
Helobdella stagnalis	--	--	--	--	1	0.23	--	--
Mooreobdella microstoma	1	2.08	1	1.72	--	--	--	--
Caecidotea	--	--	1	1.72	11	2.48	--	--
Crangonyx	--	--	1	1.72	--	--	1	2.63
Hydracarina	--	--	--	--	1	0.23	--	--
Baetis flavistriga	--	--	1	1.72	31	7.00	2	5.26
Stenonema femoratum	--	--	--	--	1	0.23	--	--
Caenis	--	--	1	1.72	--	--	--	--
Calopteryx	--	--	--	--	--	--	5	13.16
Aeshnidae	--	--	--	--	1	0.23	--	--
Boyeria grafiana	--	--	--	--	--	--	1	2.63
Cheumatopsyche	3	6.25	11	18.97	16	3.61	3	7.89
Hydropsyche depravata grp.	--	--	--	--	7	1.58	1	2.63
Stenelmis	10	20.83	18	31.03	27	6.09	9	23.68
Ablabesmyia mallochi	--	--	--	--	14	3.16	--	--
Thienemannimyia grp.	1	2.08	3	5.17	44	9.93	--	--
Corynoneura lobata	--	--	--	--	5	1.13	--	--
Cricotopus tremulus grp.	8	16.67	1	1.72	24	5.42	2	5.26
Cricotopus bicinctus grp.	12	25.00	5	8.62	5	1.13	1	2.63
Eukiefferiella claripennis grp.	--	--	--	--	--	--	1	2.63
Chironomus	--	--	--	--	3	0.68	1	2.63
Cryptochironomus	--	--	1	1.72	--	--	--	--
Dicrotendipes fumidus	--	--	--	--	24	5.42	1	2.63
Paratendipes	1	2.08	1	1.72	11	2.48	--	--
Phaenopsectra obediens grp.	1	2.08	--	--	--	--	--	--
Polypedilum flavum	--	--	1	1.72	16	3.61	--	--
Polypedilum illinoense	3	6.25	1	1.72	14	3.16	--	--
Polypedilum scalaenum grp.	2	4.17	2	3.45	57	12.87	--	--
Paratanytarsus	--	--	--	--	33	7.45	--	--
Tanytarsus glabrescens grp.	--	--	--	--	27	6.09	1	2.63
Tanytarsus guerlus grp.	--	--	--	--	3	0.68	--	--
Pericoma	--	--	--	--	--	--	2	5.26
Simulium	--	--	1	1.72	1	0.23	1	2.63
Hemerodromia	1	2.08	--	--	1	0.23	--	--
Physa	--	--	1	1.72	--	--	--	--
Helisoma	--	--	--	--	1	0.23	--	--
TOTAL	48	100.00	58	100.00	443	100.00	38	100.00
TOTAL TAXA	12		19		29		17	

TAXA COMPOSITION, NUMBER, AND PERCENT OF ORGANISMS COLLECTED IN EACH HESTER-DENDY AND QUALITATIVE SAMPLE AT LOCATION MILL CREEK (MC31), AUGUST AND SEPTEMBER 2006.

TAXA	AUGUST				SEPTEMBER			
	HESTER		QUAL		HESTER		QUAL	
	#	%	#	%	#	%	#	%
Turbellaria	--	--	--	--	--	--	1	3.03
Oligochaeta	107	36.03	--	--	18	4.25	1	3.03
Erpobdella punctata punctata	12	4.04	1	5.56	3	0.71	--	--
Mooreobdella microstoma	--	--	2	11.11	--	--	--	--
Caecidotea	3	1.01	--	--	5	1.18	2	6.06
Gammarus	--	--	--	--	6	1.42	--	--
Hydracarina	--	--	--	--	2	0.47	--	--
Baetis intercalaris	--	--	--	--	2	0.47	1	3.03
Baetis flavistriga	2	0.67	4	22.22	23	5.42	9	27.27
Hetaerina	--	--	--	--	1	0.24	--	--
Cheumatopsyche	--	--	--	--	11	2.59	1	3.03
Hydropsyche depravata grp.	--	--	--	--	8	1.89	2	6.06
Ceratopsyche morosa	--	--	--	--	37	8.73	4	12.12
Ceratopsyche sparna	--	--	--	--	31	7.31	6	18.18
Hydroptila	10	3.37	--	--	--	--	--	--
Thienemannimyia grp.	24	8.08	1	5.56	232	54.72	3	9.09
Cricotopus tremulus grp.	4	1.35	--	--	3	0.71	1	3.03
Cricotopus bicinctus grp.	40	13.47	3	16.67	--	--	--	--
Nanocladius	--	--	--	--	3	0.71	--	--
Chironomus	6	2.02	1	5.56	--	--	--	--
Cryptochironomus	2	0.67	1	5.56	--	--	--	--
Phaenopsectra obediens grp.	--	--	--	--	3	0.71	--	--
Phaenopsectra punctipes grp.	--	--	--	--	3	0.71	--	--
Polypedilum fallax grp.	--	--	--	--	3	0.71	--	--
Polypedilum flavum	4	1.35	--	--	3	0.71	--	--
Polypedilum illinoense	68	22.90	3	16.67	3	0.71	1	3.03
Polypedilum scalaenum grp.	14	4.71	1	5.56	19	4.48	--	--
Paratanytarsus	--	--	--	--	3	0.71	--	--
Tipula	--	--	--	--	1	0.24	1	3.03
Hemerodromia	--	--	--	--	1	0.24	--	--
Physa	--	--	1	5.56	--	--	--	--
Helisoma	1	0.34	--	--	--	--	--	--
TOTAL	297	100.00	18	100.00	424	100.00	33	100.00
TOTAL TAXA	14		10		24		13	