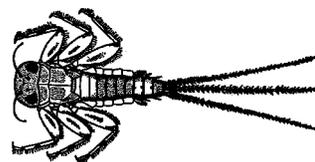
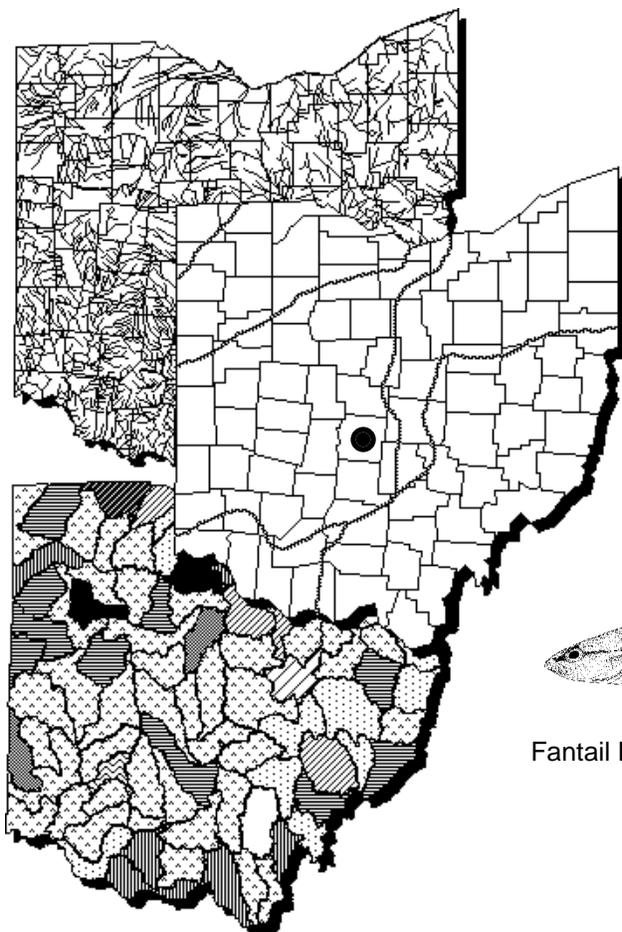
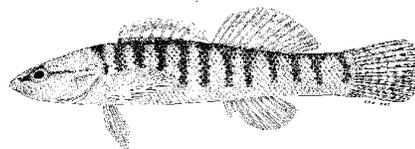


# Biological and Water Quality Study of Mason Run 1996

**Franklin County  
Columbus, Ohio**



Mayfly (*Stenonema*)



Fantail Darter (*Etheostoma flabellare*)

March 11, 1998

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Franklin County  
Columbus, Ohio

March 11, 1998

OEPA Technical Report MAS/1996-12-6

Prepared by

State of Ohio Environmental Protection Agency  
Division of Surface Water  
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## Introduction and Methods

Fish and macroinvertebrate communities were sampled during the summer of 1996 at three locations in Mason Run from river mile (RM) 6.1 to the mouth (RM 0.5) (Table 1). Sampling was conducted in Mason Run to assess the condition of fish and macroinvertebrate communities and determine the appropriate aquatic life use designation for the stream. Fish collections were made once at each site between October 15 and October 17 using pulsed DC electrofishing gear, with sampling distances varying between 120 and 160 meters. Qualitative macroinvertebrate collections were made on September 5 and October 17, 1996 by sampling all available natural substrates in the near vicinity of the sampling site. Fish and macroinvertebrate field work, laboratory, data processing and data analysis methods and procedures conducted by Ohio EPA were consistent with those specified in Ohio EPA manuals (1987, 1989b, 1989c). Evaluation of aquatic life uses was determined by using biological criteria codified in Ohio Administrative Code (OAC) 3745-1-07, Table 7-14. The Index of Biotic Integrity (IBI) was used to evaluate the performance of the fish community. The IBI is a multi-metric index patterned after an original IBI described by Karr (1981) and Fausch *et al.* (1984). Qualitative macroinvertebrate sampling consisted of an inventory of taxa at a sampling station with an attempt to field estimate predominant populations. An assessment of the status of the designated aquatic life use was made based on best professional judgement utilizing sample attributes such as taxa richness and EPT (Ephemeroptera - mayfly, Plecoptera - stonefly, and Trichoptera -caddisfly) richness - an indication of the prevalence of pollution sensitive organisms.

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

Surface water grab samples were collected in Mason Run on five different occasions by Ohio EPA between June 19 and September 24, 1991. All chemical and physical, field and laboratory methods and procedures followed those specified in the Manual of Ohio EPA Surveillance Methods and Quality Assurance Practices (Ohio EPA 1989a).

Mason Run, a tributary of Big Walnut Creek, is located in the Eastern Corn Belt Plains ecoregion and is currently assigned the Warmwater Habitat (WWH) aquatic life use. Turkey Run, a tributary to Mason Run, is not listed in the Water Quality Standards and therefore, does not have an assigned aquatic life use designation.

Table 1. Sampling locations in Mason Run, 1996. Type of sampling included fish (F) and macroinvertebrate (M) communities, surface water chemistry (C), and only QHEI (Q).

| <i>Stream/<br/>River Mile</i> | Type of<br>Sampling | Latitude  | Longitude | Landmark        | County   | USGS 7.5 min.<br>Quad. Map |
|-------------------------------|---------------------|-----------|-----------|-----------------|----------|----------------------------|
| <i>Mason Run</i>              |                     |           |           |                 |          |                            |
| 6.1                           | F,M                 | 39°59'10" | 82°53'30" | Dst. Fifth Ave. | Franklin | SE Columbus, OH            |
| 3.7                           | F,M                 | 39°57'27" | 82°53'55" | Elm St.         | Franklin | SE Columbus, OH            |
| 0.5                           | F,M,C               | 39°54'57" | 82°53'26" | Refugee Rd.     | Franklin | SE Columbus, OH            |
| <i>Turkey Run</i>             |                     |           |           |                 |          |                            |
| 1.5                           | Q                   | 39°59'08" | 82°54'21" | Ust. Fifth Ave. | Franklin | SE Columbus, OH            |
| 0.3                           | Q                   | 39°58'13" | 82°53'50" | Doney St.       | Franklin | SE Columbus, OH            |

## Summary and Conclusions

During September and October, 1996 Ohio EPA's Division of Surface Water staff conducted biological community sampling of Mason Run between Fifth Ave. and Refugee Road. In addition, Ohio EPA Central District Office staff collected surface water samples during 1991. The results of these sampling events are summarized below.

- Biological communities were in non-attainment of the recommended Modified Warmwater Habitat aquatic life use designation at the upper two sampling locations (RMs 6.1 and 3.7). Conditions improved to partial biological attainment of the Warmwater Habitat use near the mouth (RM 0.5). The 1996 biological results revealed that 4.0 miles of Mason Run were not meeting the appropriate (current or recommended) use designation and 2.1 miles were in partial attainment.
- In the channel modified segment of Mason Run, biological conditions were in the very poor to fair range, with toxic conditions observed in the fish community at RM 6.1 and in the macroinvertebrate community at RM 3.7. In the lower natural segment of Mason Run, fish and macroinvertebrate communities were in the fair to good range. Although toxic conditions were reflected in the biological results in the upper section of stream, overall conditions suggest nutrient enrichment was occurring throughout Mason Run.
- Mason Run between RMs 6.1 (Fifth Ave.) and 1.9 (I-70) has been previously modified, with 1.5 miles completely enclosed in a culvert. The cause of biological impairment in this reach is uncertain, although Mason Run receives urban stormwater runoff, and permitted point sources discharge to the upper section of stream.
- Mason Run is currently designated Warmwater Habitat in the Ohio Water Quality Standards. Based on Qualitative Habitat Evaluation Index scores, channel modification and the complete enclosure of part of Mason Run, a recommendation of Modified Warmwater Habitat for Mason Run between Fifth Ave. (RM 6.1) and I-70 (RM 1.9) is appropriate. Physical habitat conditions in Turkey Run, a tributary to Mason Run, was evaluated in 1997. Turkey Run should be designated Modified Warmwater Habitat from James Road (RM 1.6) to the mouth. Turkey Run has a drainage area of 3.3 square miles, a dominance of modified warmwater habitat attributes, channel modified characteristics, and low QHEI scores. The extreme headwaters of Mason Run and Turkey Run, located primarily on Columbus Airport property, lack adequate water depth to maintain the Modified Warmwater Habitat use. Therefore, the extreme headwaters of Mason Run (RM 6.1-7.5) and Turkey Run (RM 1.6-4.1) are recommended as Limited Resource Waters.
- Overall chemical surface water quality in the lower 0.5 miles of Mason Run was considered good in 1991; exceedences of Ohio Water Quality Standards criteria were limited to total iron and fecal coliform bacteria. Elevated fecal coliform and fecal strep bacteria values documented in Mason Run show some contribution of animal and/or human waste reaching the stream.

Table 2. Aquatic life use attainment status for Mason Run based on data collected during October, 1996.

| RIVER MILE<br>Fish/Invert.  | Modified    |     |                  | QHEI <sup>b</sup> | Attainment<br>Status | Comment       |
|---|-------------|-----|------------------|-------------------|----------------------|---------------|
|   | IBI         | Iwb | ICI <sup>a</sup> |                   |                      |               |
| <b>Mason Run</b>  |             |     |                  |                   |                      |               |
| <i>Eastern Corn Belt Plains - MWH Use Designation (Recommended)</i> |             |     |                  |                   |                      |               |
| 6.1/6.1   | <u>12</u> * | NA  | F                | 49.0              | NON                  | Fifth Ave.    |
| 3.7/3.7   | <u>24</u>   | NA  | <u>VP</u> *      | 52.5              | NON                  | Near Main St. |
| <i>Eastern Corn Belt Plains - WWH Use Designation (Existing)</i>    |             |     |                  |                   |                      |               |
| 0.5/0.5   | 40          | NA  | F*               | 74.5              | Partial              | Refugee Rd.   |

**Ecoregion Biocriteria:** *Eastern Corn Belt Plains (ECBP)*

| <u>INDEX</u>    | <u>WWH</u> | <u>EWH</u> | <u>MWH</u> <sup>c</sup> |
|-----------------|------------|------------|-------------------------|
| IBI - Headwater | 40         | 50         | 24                      |
| ICI             | 36         | 46         | 22                      |

\* - Significant departure from ecoregion biocriterion; poor and very poor results are underlined.

ns - Nonsignificant departure from ecoregion biocriterion for WWH ( 4 IBI or ICI units; 0.5 MIwb units).

NA - Not applicable.

a - Narrative evaluation used in lieu of ICI (E=Exceptional; VG= Very good; G=good; MG=Marginally good; F=Fair; P=Poor; VP=Very Poor).

b - Qualitative Habitat Evaluation Index (QHEI) values based on Rankin (1989).

c - Modified Warmwater Habitat for channel modified areas/ mine affected areas.

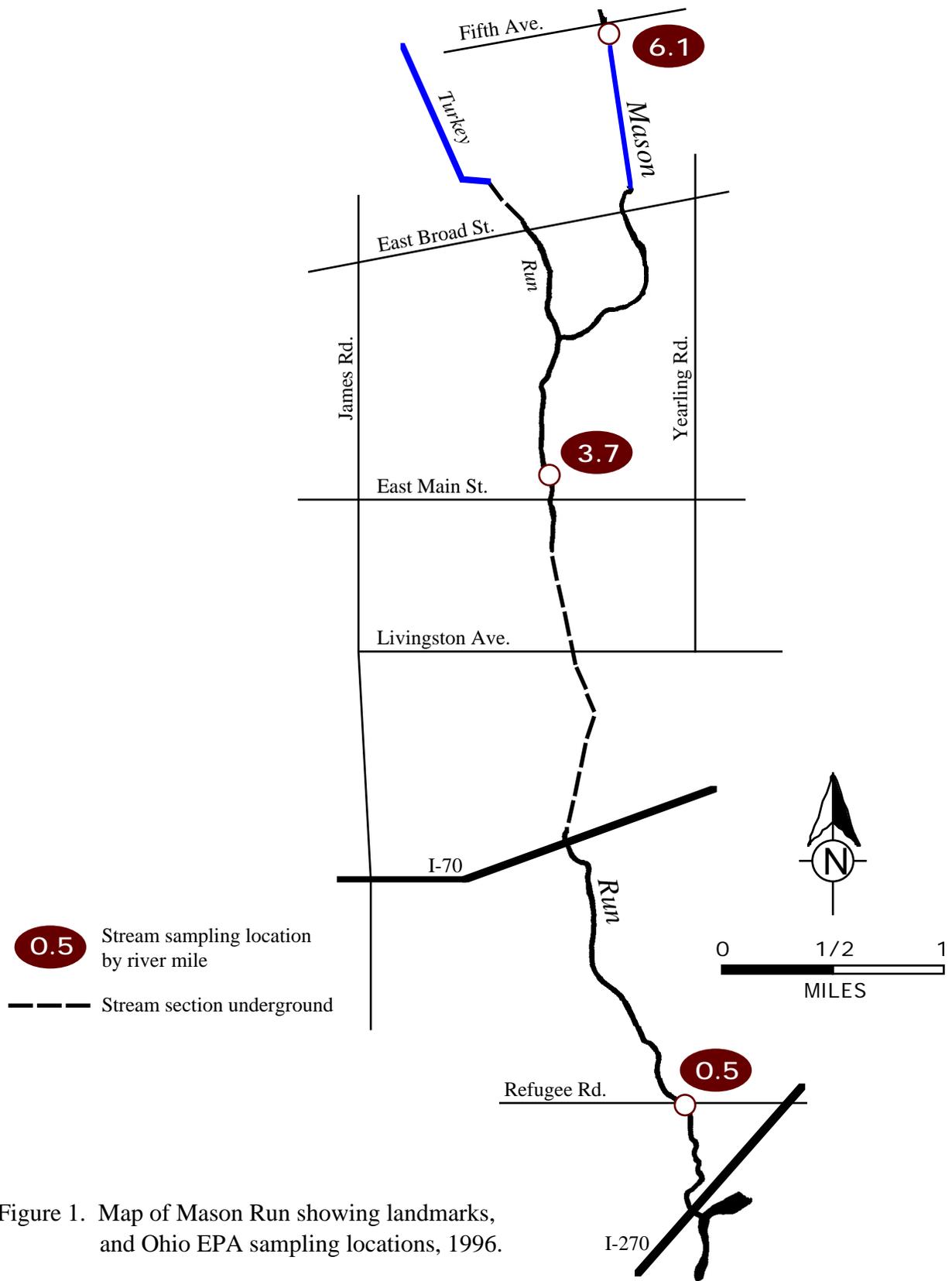


Figure 1. Map of Mason Run showing landmarks, and Ohio EPA sampling locations, 1996.

## **Physical Habitat for Aquatic Life**

### *Mason Run*

Stream morphology at the upper most Mason Run biological sampling location (RM 6.1 - downstream from Fifth Ave.) consisted of only fair to poor pool and riffle development. Bottom substrates were predominated by gravel, sand, and cobble. This sampling area of Mason Run appeared to have been previously modified, although the channel has begun to show signs of recovery. Both sides of the riparian corridor were well vegetated, with trees within the sampling zone; this was atypical for the upper part of Mason Run. The QHEI score at RM 6.1 was 49.0 and the high number of modified habitat attributes (Table 3) reflected fair quality stream habitat.

Physical habitat at RM 3.7 (Elm St.) was of fair quality, with bottom substrates predominated by gravel, cobble, and artificial riprap, marginal amounts of instream cover, and fair pool and riffle development. Historical channel modification of Mason Run was apparent at RM 3.7. The QHEI score of 52.5 and a predominance of modified warmwater habitat attributes was indicative of fair quality stream habitat.

Mason Run in the vicinity of Refugee Road (RM 0.5) consisted of good physical habitat. Gravel and cobble were the two predominant bottom substrates. The stream gradient in this area was the highest in the study area (16.7 ft./ mile). The QHEI score of 74.5 and a large number of warmwater habitat attributes was indicative of good quality stream habitat.

An evaluation of ten locations was conducted to assess the overall physical habitat condition of Mason Run downstream from the Columbus Airport (QHEIs were not conducted at these locations). Results revealed the following conclusions:

- RM 0.0 - 0.3: natural habitat features
- RM 0.3 - 0.5: channel modified with some recovery
- RM 0.5 - 1.9: natural (Refugee Road to I-70)
- RM 1.9 - 3.4: stream completely enclosed in concrete conduit (I-70 to Whitehall/Columbus corporation line)
- RM 3.4 - 5.3: primarily channel modified with some recovery (corp. line to Broad Street)
- RM 5.3 - 6.1: channel modified (runs through the Defense Construction Supply Center)

Mason Run should be redesignated Modified Warmwater Habitat from Fifth Ave. (RM 6.1) to I-70 (RM 1.9). This recommendation is supported by the QHEI scores, historical channel modification (bank shaping, artificial substrates), predominance of modified warmwater habitat attributes, and the complete enclosure of Mason Run from I-70 (RM 1.9) to the Whitehall/Columbus corporation line (RM 3.4). Based on physical habitat conditions, the lower 1.9 miles of Mason Run should retain the existing WWH aquatic life use designation. The extreme headwater of Mason Run, located primarily on Columbus Airport property, lacks adequate water depth to maintain the Modified Warmwater Habitat use. Therefore, Mason Run from RM 6.1 to RM 7.5 is recommended as a Limited Resource Water.

### *Turkey Run*

Physical habitat was evaluated in Turkey Run at two locations during 1997. Based on these two stations, Turkey Run should be designated Modified Warmwater Habitat from RM 1.6 to the mouth. Turkey Run has a drainage area of 3.3 square miles, a dominance of modified warmwater habitat attributes, channel modified characteristics, and low QHEI scores. The extreme headwater of Turkey Run, located primarily on Columbus Airport property, lacks adequate water depth to maintain the Modified Warmwater Habitat use. Therefore, Turkey Run from RM 4.1 to the mouth is recommended as a Limited Resource Water.

Table 4. Qualitative Habitat Evaluation Index (QHEI) matrix showing modified and warmwater habitat characteristics for Mason Run and Turkey Run, 1996 and 1997.

| River Mile                 | QHEI | Gradient (ft/mile) | WWH Attributes  |                      |                           |                         |                          |                     |                                  |                    |                            |                      | MWH Attributes                                  |               |                   |                            |                         |                    |                           |                        |                          |                       |                  |                      |                           |                 |                                |                               |           |                         |                  |
|----------------------------|------|--------------------|---|----------------------|---------------------------|-------------------------|--------------------------|---------------------|----------------------------------|--------------------|----------------------------|----------------------|---|---------------|-------------------|----------------------------|-------------------------|--------------------|---------------------------|------------------------|--------------------------|-----------------------|------------------|----------------------|---------------------------|-----------------|--------------------------------|-------------------------------|-----------|-------------------------|------------------|
|                            |      |                    |   |                      |                           |                         |                          |                     |                                  |                    |                            |                      | High Influence                                  |               |                   |                            |                         | Moderate Influence |                           |                        |                          |                       |                  |                      |                           |                 |                                |                               |           |                         |                  |
|                            |      |                    | No Channelization or Recovered Boulder/Cobble/Gravel Substrates | Silt Free Substrates | Good/Excellent Substrates | Moderate/High Sinuosity | Extensive/Moderate Cover | Fast Current/Eddies | Low/Natural Overall Embeddedness | Max. Depth > 40 cm | Low/No Riffle Embeddedness | Total WWH Attributes | Channelized or No Recovery Silt/Muck Substrates | Low Sinuosity | Sparsely/No Cover | Max. Depth < 40 cm (WD/HW) | Total HL 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 & Poor Pools | No Fast Current | High/Mod. Overall Embeddedness | High/Mod. Riffle Embeddedness | No Riffle | Total LL MWH Attributes | MWH HL/WWH Ratio |
| <b>Key QHEI Components</b> |      |                    |   |                      |                           |                         |                          |                     |                                  |                    |                            |                      |   |               |                   |                            |                         |                    |                           |                        |                          |                       |                  |                      |                           |                 |                                |                               |           |                         |                  |
| <b>(02-122) Mason Run</b>  |      |                    |   |                      |                           |                         |                          |                     |                                  |                    |                            |                      |   |               |                   |                            |                         |                    |                           |                        |                          |                       |                  |                      |                           |                 |                                |                               |           |                         |                  |
| Year: 96                   |      |                    |   |                      |                           |                         |                          |                     |                                  |                    |                            |                      |   |               |                   |                            |                         |                    |                           |                        |                          |                       |                  |                      |                           |                 |                                |                               |           |                         |                  |
| 6.1                        | 49.0 | 9.90               | ■   |                      |                           |                         |                          |                     |                                  |                    | 1                          | ●                    | ●   | ●             | 3                 | ▲                          | ▲                       | ▲                  | ▲                         |                        | ▲                        | ▲                     | ▲                |                      |                           |                 |                                | 7                             | 2.00      | 5.50                    |                  |
| 3.7                        | 53.5 | 8.33               | ■   |                      | ■                         |                         |                          | ■                   |                                  |                    | 3                          | ●                    | ●   |               | 2                 | ▲                          |                         | ▲                  | ▲                         |                        | ▲                        | ▲                     | ▲                |                      |                           |                 |                                | 6                             | 0.75      | 2.25                    |                  |
| 0.5                        | 74.5 | 16.67              | ■   | ■                    | ■                         | ■                       | ■                        | ■                   |                                  |                    | 6                          | ●                    |   |               | 1                 | ▲                          |                         | ▲                  |                           |                        | ▲                        | ▲                     | ▲                |                      |                           |                 |                                | 5                             | 0.29      | 1.00                    |                  |
| <b>(02-299) Turkey Run</b> |      |                    |   |                      |                           |                         |                          |                     |                                  |                    |                            |                      |   |               |                   |                            |                         |                    |                           |                        |                          |                       |                  |                      |                           |                 |                                |                               |           |                         |                  |
| Year: 97                   |      |                    |   |                      |                           |                         |                          |                     |                                  |                    |                            |                      |   |               |                   |                            |                         |                    |                           |                        |                          |                       |                  |                      |                           |                 |                                |                               |           |                         |                  |
| 1.5                        | 33.0 | 6.94               | ■   |                      |                           |                         |                          |                     |                                  |                    | 1                          | ●                    | ●   | ●             | ●                 | 4                          | ▲                       | ▲                  | ▲                         | ▲                      | ▲                        | ▲                     | ▲                | ▲                    | ▲                         | ▲               |                                | 8                             | 2.50      | 6.50                    |                  |
| 0.3                        | 34.5 | 6.94               |   |                      |                           |                         |                          |                     |                                  |                    | 0                          | ●                    | ●   | ●             | 3                 | ▲                          | ▲                       | ▲                  | ▲                         |                        | ▲                        | ▲                     | ▲                |                      |                           | ▲               |                                | 7                             | 4.00      | *. **                   |                  |

### Macroinvertebrate Community

In 1996 macroinvertebrate communities were sampled in Mason Run at three locations. Results from the macroinvertebrate data are compiled in Table 4. Taxa lists by river mile are attached as Appendix Table 1.

Qualitative samples were collected from Mason Run at Fifth Avenue (RM 6.1), Elm Street (RM 3.7), and Refuge Road (RM 0.5). The macroinvertebrate community at RM 6.1 indicated fair conditions with 25 total taxa and four EPT taxa collected. The site was predominated by blackflies in the riffles with high densities of filamentous algae. The site at RM 3.7 indicated very poor conditions with only ten taxa collected including one EPT taxon. The predominant organism was the freshwater limpet *Ferrissia sp.* indicating enriched conditions with low dissolved oxygen levels. Near the confluence with Big Walnut Creek (RM 0.5) the macroinvertebrate community returned to the fair range with 29 taxa collected including three EPT taxa. Clear bodied midges were the predominant organisms and heavy growths of algae covered the substrates. Mason Run showed signs of high nutrient inputs in all reaches sampled with toxic conditions in the middle reach.

Table 4. Summary of qualitative macroinvertebrate data collected from natural substrates in Mason Run, 1996.

| Stream/<br>River Mile          | No. Qualitative<br>Taxa | Qualitative<br>EPT <sup>a</sup> | Relative<br>Density <sup>b</sup> | Predominate<br>Organism | Narrative<br>Evaluation <sup>c</sup> |
|--------------------------------|-------------------------|---------------------------------|----------------------------------|-------------------------|--------------------------------------|
| <b><i>Mason Run (1996)</i></b> |                         |                                 |                                  |                         |                                      |
| 6.1                            | 25                      | 4                               | Low                              | Blackflies              | Fair                                 |
| 3.7                            | 10                      | 1                               | Very Low                         | <i>Ferrissia</i>        | Very Poor                            |
| 0.5                            | 29                      | 3                               | Low                              | Midges                  | Fair                                 |

a EPT= total Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) taxa richness is a common measure of the presence of members of these relatively pollution sensitive orders.

b Based on field observations.

c The qualitative narrative evaluation is based on best professional judgement utilizing sample attributes such as taxa richness, EPT richness, and predominate organisms and is used when quantitative data is not available to calculate the Invertebrate Community Index (ICI) scores.

## **Fish Community**

A total of 1,156 fish representing 15 species were collected from Mason Run between October 17 and 19, 1996. Creek chub (40.4%) and central stoneroller (26.8%) dominated the catch numerically. These two species, combined with bluntnose minnow (9.1%), and green sunfish (5.5%) made up 82% of the fish collected in Mason Run. Seventy-nine (79) percent of the fish from the study area were collected at the site located near the mouth at Refugee Road. IBI metrics and scores, and relative numbers and species collected per location are presented in Appendix Tables 2 and 3, respectively.

The fish community at the upstream Mason Run sampling location (RM 6.1 - downstream Fifth Ave.) was very poor, with only two species present (Table 5). The two species collected, creek chub and green sunfish, are highly tolerant of environmental disturbances. The IBI score of 12 did not achieve the MWH ecoregional biocriterion, and the low IBI score suggested toxic conditions instream.

Fish community results at RM 3.7 (Elm St.) were reflective of poor water quality conditions. Although the IBI score was 24 and in the poor range, the site was achieving the MWH biocriterion. Eighty-eight (88) percent of the fish collected at RM 3.7 are classified as highly tolerant of pollution.

A substantial improvement in the fish community occurred at the most downstream sampling location (RM 0.5, Refugee Road). The number of fish and number of fish species was the highest of all three sites. The IBI score of 40 was representative of good water quality conditions and achieved the WWH biocriterion.

Table 5. Fish community summaries based on pulsed D.C. electrofishing sampling conducted by Ohio EPA in Mason Run during October, 1996. Each site was sampled once for fish. Relative numbers are per 0.3 km for wading sites.

| <i>Stream</i><br>RM  | Sampling<br>Method | Total #<br>Species  | Relative<br>Number | QHEI              | Index of Biotic<br>Integrity   | Narrative<br>Evaluation <sup>a</sup> |
|--|--------------------|---------------------|--------------------|-------------------|--------------------------------|--------------------------------------|
| <b><i>Mason Run (1996)</i></b>   |                    |                     |                    |                   |                                |                                      |
| 6.1  | Wading             | 2                   | 65                 | 49.0              | <u>12</u> *                    | Very Poor                            |
| 3.7  | Wading             | 8                   | 420                | 55.5              | <u>24</u>                      | Poor                                 |
| 0.5  | Wading             | 14                  | 1812               | 74.5              | <u>40</u>                      | Good                                 |
| <b>Ecoregion Biocriteria: Eastern Corn Belt Plains (ECBP)</b><br>(from Ohio Administrative Code 3745-1-07, Table 7-17) |                    |                     |                    |                   |                                |                                      |
|  |                    | <b><u>INDEX</u></b> | <b><u>WWH</u></b>  | <b><u>EWH</u></b> | <b><u>MWH</u></b> <sup>b</sup> |                                      |
|  |                    | IBI - Headwater     | 40                 | 50                | 24                             |                                      |

\* Significant departure from ecoregional biocriteria (>4 IBI units); poor and very poor results are underlined.

<sup>a</sup> Narrative evaluation is based on IBI scores.

<sup>b</sup> Modified Warmwater Habitat for channel modified areas.

**Chemical Spills/Wildlife Kills/ Surface Water Quality**

Surface water samples were collected by Ohio EPA from Mason Run between June 19 and September 24, 1991. Chemical analyses of these samples are presented in Table 6. Overall chemical surface water quality in the lower 0.5 miles of Mason Run was considered good, with exceedences of Ohio Water Quality Standards criteria limited to total iron and fecal coliform bacteria. Elevated fecal coliform and fecal strep bacteria values documented in Mason Run indicate some contribution of animal and/ or human waste reaching the stream.

Chemical spills and wild animal kills are additional indications of impacts due to excessive pollutant loadings. Reviews were conducted for discharges and kills in Mason Run and Turkey Run as reported by the Ohio EPA Division of Emergency and Remedial Response and the Ohio DNR Division of Wildlife. Spills are listed in Table 7. In all of the reported spills to Mason Run and Turkey Run, the amount and type of material spilled was generally unknown. A majority of spills were reported prior to 1992, and only one spill was reported during 1996. The Ohio Department of Natural Resources did not report any wild animal kills for Mason Run or Turkey Run.

Table 6. Surface water chemical sampling results from Mason Run collected at Refugee Road (RM 0.5) between June 19 and September 24, 1991. Exceedences of applicable Ohio Water Quality Standards are indicated with asterisks.

| Parameter                 | Concentration     |                   |                   |                  |                   |
|---------------------------|-------------------|-------------------|-------------------|------------------|-------------------|
|                           | RM 0.5<br>6/19/91 | RM 0.5<br>7/16/91 | RM 0.5<br>8/19/91 | RM 0.5<br>9/3/91 | RM 0.5<br>9/24/91 |
| Dissolved Oxygen (mg/l)   | 9.2               | 6.1               | 7.4               | 10.4             | 8.3               |
| Temperature °C            | 22.3              | 18.0              | 20.2              | 18.0             | 12.3              |
| Ammonia-N (mg/l)          | <0.05             | <0.05             | <0.05             | 0.09             | 0.49              |
| BOD <sub>5</sub> (mg/l)   | 1.1               | <1.0              | 1.3               | <1.0             | 1.0               |
| COD (mg/l)                | 13                | 38                | 20                | 14               | 13                |
| Conductivity (umhos/cm)   | 700               | 625               | 450               | 700              | 340               |
| Nitrate-Nitrite,N (mg/l)  | 1.04              | 0.55              | 2.29              | 0.16             | 4.57              |
| Nitrite-N (mg/l)          | 0.02              | <0.02             | 0.02              | 0.03             | 0.10              |
| TKN (mg/l)                | 0.40              | 0.30              | 0.40              | 0.20             | 1.00              |
| pH (SU)                   | 7.95              | 7.67              | 8.02              | 7.88             | 8.02              |
| Phosphorus, T (mg/l)      | 0.28              | 0.17              | 0.21              | <0.05            | 0.54              |
| Residue, T. Nflt. (mg/l)  | 6                 | 14                | 7                 | 7                | <5                |
| Residue, Total (mg/l)     | 438               | 522               | 342               | 560              | 346               |
| Chloride (mg/l)           | 52                | 48                | 33                | 50               | 30                |
| Sulfate, T. (mg/l)        | 70                | 66                | 54                | 66               | -                 |
| Arsenic, T (ug/l)         | 3                 | 2                 | 2                 | 3                | 3                 |
| Cadmium, T. (ug/l)        | 0.4               | 0.5               | 0.3               | <0.2             | <0.2              |
| Calcium, T (,mg/l)        | 85                | 85                | 56                | 111              | 49                |
| Chromium, T. (ug/l)       | <30               | <30               | <30               | <30              | <30               |
| Copper, T. (ug/l)         | -                 | 15                | <10               | <2               | <10               |
| Iron, T. (ug/l)           | -                 | 1770**            | 1080**            | 1490**           | 290               |
| Lead, T. (ug/l)           | -                 | 11                | 3                 | <2               | <2                |
| Magnesium, T. (mg/)       | -                 | 24                | 13                | 32               | 11                |
| Nickel, T. (ug/l)         | <40               | <40               | <40               | <40              | <40               |
| Zinc, T. (ug/l)           | 25                | 60                | 40                | 15               | 35                |
| Hardness, T. (mg/l)       | 307               | 311               | 193               | 409              | 168               |
| Cyanide, T. (ug/l)        | <5                | <5                | <5                | <5               | <5                |
| Phenols, T. (ug/l)        | <10               | <10               | <10               | <10              | <10               |
| Fecal Coliform (#/100 ml) | 920               | 660               | 2500*             | 1500*            | 3600*             |
| Fecal Strep. (#/100 ml)   | -                 | 1340              | -                 | 1500             | 2300              |

\* - exceeds Primary Contact Recreation criterion.

\*\* - exceedence of Warmwater Habitat outside mixing zone 30-day average criterion.

Table 7. Summary of pollutant discharges to Mason Run and Turkey Run reported to the Ohio EPA, Division of Emergency and Remedial Response from January 1989 - December 1996.

| Date     | Stream     | Entity                        | Material       | Amount  |
|----------|------------|-------------------------------|----------------|---------|
| 09/22/89 | Mason Run  | Etna Battery                  |                | unknown |
| 02/07/90 | Mason Run  | McDonald Douglass             |                | unknown |
| 03/16/90 | Mason Run  | Port Columbus Airport         |                | unknown |
| 03/16/90 | Turkey Run | Slip Tec                      |                | unknown |
| 04/29/90 | Mason Run  | Nature                        |                | unknown |
| 02/05/91 | Mason Run  | DCSC                          |                | unknown |
| 03/06/91 | Turkey Run | Penske Trucks                 |                | unknown |
| 04/05/91 | Turkey Run | Unknown                       |                | unknown |
| 04/12/91 | Turkey Run | Unknown                       |                | unknown |
| 05/31/91 | Turkey Run | Unknown                       |                | unknown |
| 07/08/91 | Mason Run  | None                          |                | unknown |
| 10/22/91 | Turkey Run | Brooks Beverage               |                | unknown |
| 10/22/91 | Turkey Run | Amer. Manufactured Components |                | unknown |
| 11/12/91 | Mason Run  | Unknown                       |                | unknown |
| 12/09/91 | Turkey Run | ODOT                          |                | unknown |
| 12/10/91 | Mason Run  | Trailer Court                 |                | unknown |
| 12/19/91 | Turkey Run | DCSC                          |                | unknown |
| 06/21/93 | Mason Run  | Capitol City Crane            |                | unknown |
| 08/26/93 | Mason Run  | DCSC                          |                | unknown |
| 11/02/93 | Mason Run  | Unknown                       |                | unknown |
| 02/10/94 | Mason Run  | Unknown                       | Orphan drums   | 2       |
| 02/10/94 | Mason Run  | Unknown                       | wastewater     | unknown |
| 03/10/94 | Turkey Run | Unknown                       | Sheen on water | unknown |
| 04/28/95 | Mason Run  | Clark Oil                     | Hydrocarbon    | unknown |
| 07/09/96 | Mason Run  | Colonial East Apt.            |                | unknown |

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**Appendix Table 1. Raw macroinvertebrate data by river mile for Mason Run, 1996.**

**Ohio EPA/DSW Monitoring and Assessment Section  
Macrobenthic Collection**

Collection Date: 09/05/96 River Code: 02-122 River: Mason Run

RM: 6.10

| Taxa Code | Taxa  | Quant/Qual | Taxa Code | Taxa | Quant/Qual |
|-----------|---|------------|-----------|------|------------|
| 03600     | <i>Oligochaeta</i>                              | +          |           |      |            |
| 04664     | <i>Helobdella stagnalis</i>                     | +          |           |      |            |
| 08310     | <i>Procambarus (Ortmannicus) acutus acutus</i>  | +          |           |      |            |
| 11120     | <i>Baetis flavistriga</i>                       | +          |           |      |            |
| 11200     | <i>Callibaetis sp</i>                           | +          |           |      |            |
| 22001     | <i>Coenagrionidae</i>                           | +          |           |      |            |
| 52200     | <i>Cheumatopsyche sp</i>                        | +          |           |      |            |
| 52530     | <i>Hydropsyche depravata group</i>              | +          |           |      |            |
| 61400     | <i>Agabus sp</i>                                | +          |           |      |            |
| 63900     | <i>Laccophilus sp</i>                           | +          |           |      |            |
| 65800     | <i>Berosus sp</i>                               | +          |           |      |            |
| 67000     | <i>Helophorus sp</i>                            | +          |           |      |            |
| 74100     | <i>Simulium sp</i>                              | +          |           |      |            |
| 77120     | <i>Ablabesmyia mallochii</i>                    | +          |           |      |            |
| 77250     | <i>Alotanypus venusta</i>                       | +          |           |      |            |
| 77355     | <i>Clinotanypus pinguis</i>                     | +          |           |      |            |
| 77500     | <i>Conchapelopia sp</i>                         | +          |           |      |            |
| 77800     | <i>Helopelopia sp</i>                           | +          |           |      |            |
| 78400     | <i>Natarsia sp</i>                              | +          |           |      |            |
| 79400     | <i>Zavrelimyia sp</i>                           | +          |           |      |            |
| 80510     | <i>Cricotopus (Isocladius) sylvestris group</i> | +          |           |      |            |
| 84315     | <i>Phaenopsectra flavipes</i>                   | +          |           |      |            |
| 84470     | <i>Polypedilum (P.) illinoense</i>              | +          |           |      |            |
| 84540     | <i>Polypedilum (Tripodura) scalaenum group</i>  | +          |           |      |            |
| 95100     | <i>Physella sp</i>                              | +          |           |      |            |

No. Quantitative Taxa: 0 Total Taxa: 25

No. Qualitative Taxa: 25 ICI:

Number of Organisms: 0 Qual EPT: 4

**Ohio EPA/DSW Monitoring and Assessment Section  
Macroinvertebrate Collection**

Collection Date: 10/17/96 River Code: 02-122 River: Mason Run

RM: 3.70

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| Taxa Code | Taxa   | Quant/Qual | Taxa Code | Taxa | Quant/Qual |
|-----------|--|------------|-----------|------|------------|
| 03600     | <i>Oligochaeta</i>                             | +          |           |      |            |
| 08250     | <i>Orconectes (Procericambarus) rusticus</i>   | +          |           |      |            |
| 11120     | <i>Baetis flavistriga</i>                      | +          |           |      |            |
| 22001     | <i>Coenagrionidae</i>                          | +          |           |      |            |
| 77500     | <i>Conchapelopia sp</i>                        | +          |           |      |            |
| 78401     | <i>Natarsia species A (sensu Roback, 1978)</i> | +          |           |      |            |
| 80204     | <i>Brillia flavifrons group</i>                | +          |           |      |            |
| 80370     | <i>Corynoneura lobata</i>                      | +          |           |      |            |
| 80420     | <i>Cricotopus (C.) bicinctus</i>               | +          |           |      |            |
| 96900     | <i>Ferrissia sp</i>                            | +          |           |      |            |

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|                          |                |
|--------------------------|----------------|
| No. Quantitative Taxa: 0 | Total Taxa: 10 |
| No. Qualitative Taxa: 10 | ICI:           |
| Number of Organisms: 0   | Qual EPT: 1    |

**Ohio EPA/DSW Monitoring and Assessment Section  
Macrobenthic Collection**

Collection Date: 10/17/96 River Code: 02-122 River: Mason Run

RM: 0.50

| Taxa Code | Taxa   | Quant/Qual | Taxa Code | Taxa | Quant/Qual |
|-----------|--|------------|-----------|------|------------|
| 03600     | <i>Oligochaeta</i>                             | +          |           |      |            |
| 04664     | <i>Helobdella stagnalis</i>                    | +          |           |      |            |
| 04666     | <i>Helobdella triserialis</i>                  | +          |           |      |            |
| 04962     | <i>Mooreobdella fervida</i>                    | +          |           |      |            |
| 08310     | <i>Procambarus (Ortmannicus) acutus acutus</i> | +          |           |      |            |
| 11120     | <i>Baetis flavistriga</i>                      | +          |           |      |            |
| 13521     | <i>Stenonema femoratum</i>                     | +          |           |      |            |
| 21200     | <i>Calopteryx sp</i>                           | +          |           |      |            |
| 22300     | <i>Argia sp</i>                                | +          |           |      |            |
| 22700     | <i>Ischnura sp</i>                             | +          |           |      |            |
| 23600     | <i>Aeshna sp</i>                               | +          |           |      |            |
| 52200     | <i>Cheumatopsyche sp</i>                       | +          |           |      |            |
| 71900     | <i>Tipula sp</i>                               | +          |           |      |            |
| 71910     | <i>Tipula abdominalis</i>                      | +          |           |      |            |
| 74100     | <i>Simulium sp</i>                             | +          |           |      |            |
| 77500     | <i>Conchapelopia sp</i>                        | +          |           |      |            |
| 77800     | <i>Helopelopia sp</i>                          | +          |           |      |            |
| 78401     | <i>Natarsia species A (sensu Roback, 1978)</i> | +          |           |      |            |
| 80370     | <i>Corynoneura lobata</i>                      | +          |           |      |            |
| 80410     | <i>Cricotopus (C.) sp</i>                      | +          |           |      |            |
| 80420     | <i>Cricotopus (C.) bicinctus</i>               | +          |           |      |            |
| 80430     | <i>Cricotopus (C.) tremulus group</i>          | +          |           |      |            |
| 82730     | <i>Chironomus (C.) decorus group</i>           | +          |           |      |            |
| 83040     | <i>Dicrotendipes neomodestus</i>               | +          |           |      |            |
| 84470     | <i>Polypedilum (P.) illinoense</i>             | +          |           |      |            |
| 84520     | <i>Polypedilum (Tripodura) halterale group</i> | +          |           |      |            |
| 87540     | <i>Hemerodromia sp</i>                         | +          |           |      |            |
| 95100     | <i>Physella sp</i>                             | +          |           |      |            |
| 96900     | <i>Ferrissia sp</i>                            | +          |           |      |            |

|                          |                |
|--------------------------|----------------|
| No. Quantitative Taxa: 0 | Total Taxa: 29 |
| No. Qualitative Taxa: 29 | ICI:           |
| Number of Organisms: 0   | Qual EPT: 3    |

**Appendix Table 2. Summary of relative numbers of fish and species collected at each location by river mile sampled in Mason Run, 1996. Relative numbers are per 0.3 km.**

# Species List

|  |   |   |
|--|---|---|
| River Code: <b>02-122</b><br>River Mile: <b>6.10</b> | Stream: <b>Mason Run</b><br>Basin: Scioto River<br>Time Fished: 953 sec      Drain Area: 0.9 sq mi<br>Dist Fished: 0.12 km      No of Passes: 1 | Sample Date: <b>1996</b><br>Date Range: 10/15/96<br><br>Sampler Type: E |
|--|---|---|

| Species<br>Name / ODNR Status | IBI<br>Grp               | Feed<br>Guild | Breed<br>Guild | Tol | # of<br>Fish | Relative<br>Number | % by<br>Number | Relative<br>Weight | % by<br>Weight | Ave(gm)<br>Weight |
|-------------------------------|--------------------------|---------------|----------------|-----|--------------|--------------------|----------------|--------------------|----------------|-------------------|
| CREEK CHUB                    | N                        | G             | N              | T   | 1            | 2.50               | 3.85           |                    |                |                   |
| GREEN SUNFISH                 | S                        | I             | C              | T   | 25           | 62.50              | 96.15          |                    |                |                   |
|                               | <i>Mile Total</i>        |               |                |     | 26           | 65.00              |                |                    |                |                   |
|                               | <i>Number of Species</i> |               |                |     | 2            |                    |                |                    |                |                   |
|                               | <i>Number of Hybrids</i> |               |                |     | 0            |                    |                |                    |                |                   |

# Species List

|                           |  |                          |
|---------------------------|--|--------------------------|
| River Code: <b>02-122</b> | Stream: <b>Mason Run</b>                         | Sample Date: <b>1996</b> |
| River Mile: <b>3.70</b>   | Basin: Scioto River                              | Date Range: 10/17/96     |
|                           | Time Fished: 1896 sec      Drain Area: 9.2 sq mi |                          |
|                           | Dist Fished: 0.16 km      No of Passes: 1        | Sampler Type: E          |

| Species<br>Name / ODNR Status | IBI<br>Grp        | Feed<br>Guild | Breed<br>Guild | Tol | # of<br>Fish             | Relative<br>Number | % by<br>Number | Relative<br>Weight | % by<br>Weight | Ave(gm)<br>Weight |
|-------------------------------|-------------------|---------------|----------------|-----|--------------------------|--------------------|----------------|--------------------|----------------|-------------------|
| WHITE SUCKER                  | W                 | O             | S              | T   | 2                        | 3.75               | 0.89           |                    |                |                   |
| CREEK CHUB                    | N                 | G             | N              | T   | 168                      | 315.00             | 75.00          |                    |                |                   |
| STRIPED SHINER                | N                 | I             | S              |     | 2                        | 3.75               | 0.89           |                    |                |                   |
| SPOTFIN SHINER                | N                 | I             | M              |     | 7                        | 13.13              | 3.13           |                    |                |                   |
| CENTRAL STONEROLLER           | N                 | H             | N              |     | 16                       | 30.00              | 7.14           |                    |                |                   |
| YELLOW BULLHEAD               |                   | I             | C              | T   | 1                        | 1.88               | 0.45           |                    |                |                   |
| GREEN SUNFISH                 | S                 | I             | C              | T   | 27                       | 50.63              | 12.05          |                    |                |                   |
| FANTAIL DARTER                | D                 | I             | C              |     | 1                        | 1.88               | 0.45           |                    |                |                   |
|                               | <i>Mile Total</i> |               |                |     | 224                      | 420.00             |                |                    |                |                   |
|                               |                   |               |                |     | <i>Number of Species</i> | 8                  |                |                    |                |                   |
|                               |                   |               |                |     | <i>Number of Hybrids</i> | 0                  |                |                    |                |                   |

# Species List

|  |   |   |
|--|---|---|
| River Code: <b>02-122</b><br>River Mile: <b>0.50</b> | Stream: <b>Mason Run</b><br>Basin: Scioto River<br>Time Fished: 2616 sec      Drain Area: 12.2 sq mi<br>Dist Fished: 0.15 km      No of Passes: 1 | Sample Date: <b>1996</b><br>Date Range: 10/17/96<br><br>Sampler Type: E |
|--|---|---|

| Species<br>Name / ODNR Status | IBI<br>Grp | Feed<br>Guild | Breed<br>Guild | Tol | # of<br>Fish | Relative<br>Number | % by<br>Number | Relative<br>Weight | % by<br>Weight | Ave(gm)<br>Weight |
|-------------------------------|------------|---------------|----------------|-----|--------------|--------------------|----------------|--------------------|----------------|-------------------|
| NORTHERN HOG SUCKER           | R          | I             | S              | M   | 1            | 2.00               | 0.11           |                    |                |                   |
| WHITE SUCKER                  | W          | O             | S              | T   | 14           | 28.00              | 1.55           |                    |                |                   |
| BLACKNOSE DACE                | N          | G             | S              | T   | 47           | 94.00              | 5.19           |                    |                |                   |
| CREEK CHUB                    | N          | G             | N              | T   | 305          | 610.00             | 33.66          |                    |                |                   |
| STRIPED SHINER                | N          | I             | S              |     | 35           | 70.00              | 3.86           |                    |                |                   |
| SPOTFIN SHINER                | N          | I             | M              |     | 47           | 94.00              | 5.19           |                    |                |                   |
| SAND SHINER                   | N          | I             | M              | M   | 1            | 2.00               | 0.11           |                    |                |                   |
| BLUNTNOSE MINNOW              | N          | O             | C              | T   | 104          | 208.00             | 11.48          |                    |                |                   |
| CENTRAL STONEROLLER           | N          | H             | N              |     | 293          | 586.00             | 32.34          |                    |                |                   |
| SMALLMOUTH BASS               | F          | C             | C              | M   | 8            | 16.00              | 0.88           |                    |                |                   |
| GREEN SUNFISH                 | S          | I             | C              | T   | 7            | 14.00              | 0.77           |                    |                |                   |
| JOHNNY DARTER                 | D          | I             | C              |     | 5            | 10.00              | 0.55           |                    |                |                   |
| GREENSIDE DARTER              | D          | I             | S              | M   | 1            | 2.00               | 0.11           |                    |                |                   |
| FANTAIL DARTER                | D          | I             | C              |     | 38           | 76.00              | 4.19           |                    |                |                   |
| <i>Mile Total</i>             |            |               |                |     | 906          | 1,812.00           |                |                    |                |                   |
| <i>Number of Species</i>      |            |               |                |     | 14           |                    |                |                    |                |                   |
| <i>Number of Hybrids</i>      |            |               |                |     | 0            |                    |                |                    |                |                   |

**Appendix Table 3. Index of Biotic Integrity (IBI) metrics and scores by river mile for locations sampled in Mason Run, 1996.**

Index of Biotic Integrity scores and metrics for Mason Run, 1996.

| River Mile           | Type | Date     | Drainage area (sq mi) | Number of     |                |                   |                   |                          |                   | Percent of Individuals |           |                   |              |                | Rel.No. minus tolerants / (0.3km) | IBI |
|----------------------|------|----------|-----------------------|---------------|----------------|-------------------|-------------------|--------------------------|-------------------|------------------------|-----------|-------------------|--------------|----------------|-----------------------------------|-----|
|                      |      |          |                       | Total species | Minnow species | Headwater species | Sensitive species | Darter & Sculpin species | Simple Lithophils | Tolerant fishes        | Omnivores | Pioneering fishes | Insectivores | DELT anomalies |                                   |     |
| Mason Run - (02-122) |      |          |                       |               |                |                   |                   |                          |                   |                        |           |                   |              |                |                                   |     |
| Year: 96             |      |          |                       |               |                |                   |                   |                          |                   |                        |           |                   |              |                |                                   |     |
| 6.10                 | E    | 10/15/96 | 0.9                   | 2(1)          | 1(1)           | 0(1)              | 0(1)              | 0(1)                     | 0(1)              | 100(1)                 | 0(1)      | 100(1)            | 96(1)        | 0.0(1)         | 0(1)*                             | 12  |
| 3.70                 | E    | 10/17/96 | 9.2                   | 8(3)          | 4(3)           | 1(1)              | 0(1)              | 1(1)                     | 2(1)              | 88(1)                  | 1(5)      | 87(1)             | 17(1)        | 0.0(5)         | 49(1)                             | 24  |
| 0.50                 | E    | 10/17/96 | 12.2                  | 14(3)         | 7(5)           | 2(3)              | 4(3)              | 3(3)                     | 5(3)              | 53(3)                  | 13(5)     | 47(3)             | 15(1)        | 0.1(3)         | 858(5)                            | 40  |