# Appendix F: Fish and Macroinvertebrate Survey Reports

## Fish Distribution and Water Quality of the Manor Kill, Schoharie County, NY

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**Abstract:** A survey of the Manor Kill, Schoharie County, NY was conducted to determine the distribution of the fish and water quality parameters of the stream. To meet this goal, 15 sites were sampled in the Manor Kill, and the Bear Kill, which is a major tributary of the Manor Kill. Data collected indicated that all water quality parameters except for alkalinity, and hardness were within optimal levels. The fish sampling showed that there is a stable trout population as well as a stable forage base for the trout.

### Introduction

This survey of the Manor Kill, Schoharie County, NY was conducted at the request of the Town of Conesville. The Manor Kill flows into the Schoharie Reservoir. This makes the Manor Kill a high interest stream to not only Schoharie County but also the City of New York. The goal of the sponsor is to determine the fish distribution, and water quality of the Manor Kill.

Historically, the Manor Kill was stocked with brown trout (*Salmo trutta*) and brook trout (*Salvilinus fontinalus*) by the New York State Department of Environmental Conservation. New York State stopped stocking this water over 30 years ago.

### Materials & Methods

Manor Kill is located in southern Schoharie County and runs through the town of Conesville along County Route 990V (Figure 1). The survey was conducted on three different dates. The water quality data was collected on 6 April 2008. The fish were sampled on two different dates. The first fish survey was on 27 April 2008, and the second was conducted on 15 September 2008.

The first part of the survey was the water quality data collection. In order to collect the water quality data, three pieces of equipment were used. The YSI water analyzer was used to collect Dissolved Oxygen, pH, Conductivity, Salinity, Temperature, and Total Dissolved Solids. In order to collect turbidity a turbidometer was used. Alkalinity and hardness was determined

using a HACH Test kit. Finally, in order to test the Phosphorus levels in the stream, a total phosphorus lab test was conducted.

Fish sampling was conducted using a Halltech 2000 backpack electrofishing unit. Each site was sampled for 1000 seconds. The fish collected were indentified. The trout, along with the largest and smallest of all other species were measured.

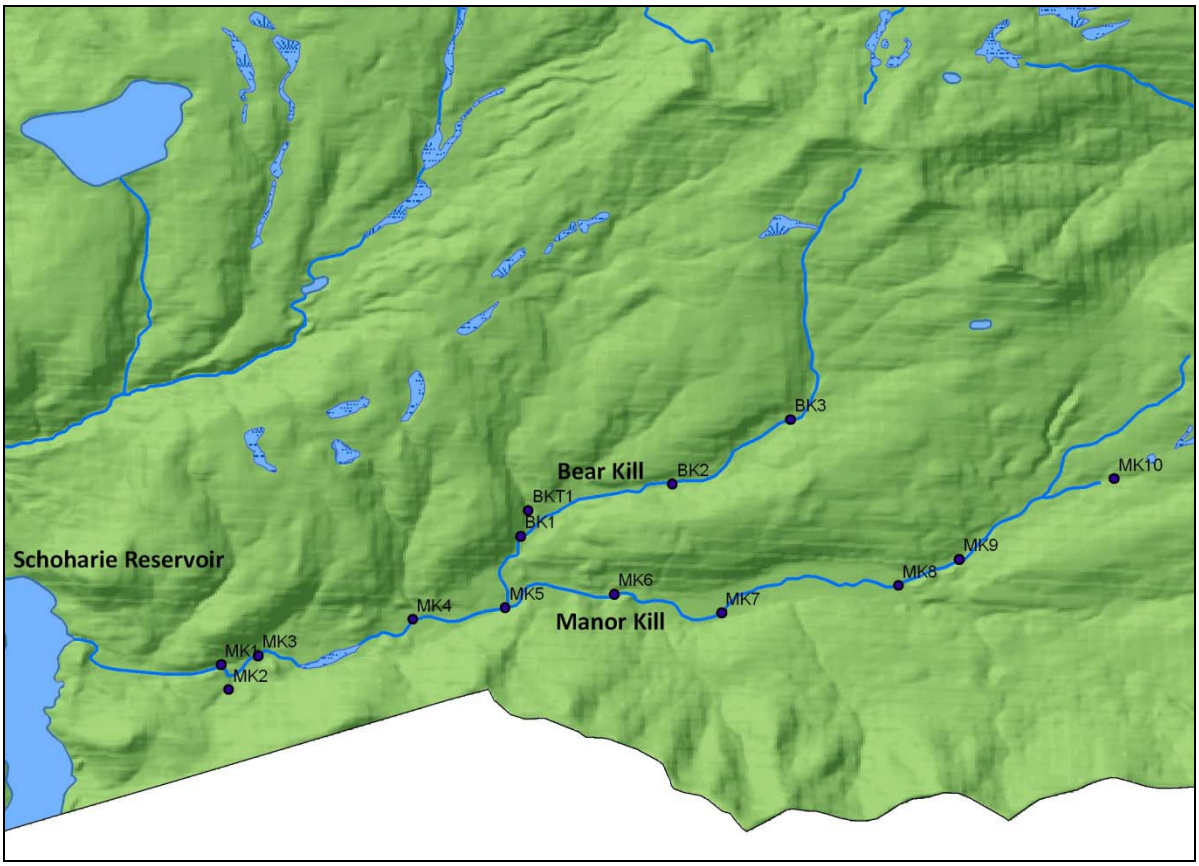


**Figure 1:** Map of sample sites on the Manor Kill, and Bear Kill Schoharie County, NY

## Results

All water quality parameters except for alkalinity, and hardness were within normal levels (Table 1). Optimal levels of hardness, and alkalinity are between 100 and 400 mg/L. Alkalinity at all sites was 17.1mg/L, and Hardness levels at all sites were 51.3mg/L (Table 1).

**Table 1:** Water Quality data for Manor Kill, Schoharie County, 4/6/08

| site | Temperature(°C) | pH | D.O. (mg/L) | TDS(g/L) | Cond(µs/cm) | Salinity | Alk(mg/L) | Hard(mg/L) | Turbidity (NTU) | Phosphorus(mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.9 | 7.3 | 13.1 | 0.017 | 16 | 0.01 | 17.1 | 51.3 | 3.5 | Below detectable limits |
| 2 | 3.4 | 6.9 | 13.2 | 0.012 | 11 | 0.01 | 17.1 | 51.3 | 3.5 | Below detectable limits |
| 3 | 3.4 | 6.8 | 13.2 | 0.017 | 15 | 0.01 | 17.1 | 68.4 | 4.2 | Below detectable limits |
| 4 | 3.4 | 6.9 | 13.1 | 0.017 | 15 | 0.01 | 17.1 | 85.5 | 3.4 | Below detectable limits |
| 5 | 3.9 | 7.3 | 12.1 | 0.32 | 26 | 0.01 | 17.1 | 34.2 | 5.0 | Below detectable limits |
| 6 | 4.1 | 6.7 | 12.8 | 0.015 | 14 | 0.01 | 17.1 | 68.4 | 6.0 | Below detectable limits |
| 7 | 4.1 | 6.8 | 12.9 | 0.014 | 13 | 0.01 | 17.1 | 51.3 | 2.3 | Below detectable limits |
| 8 | 3.6 | 6.8 | 13.2 | 0.013 | 12 | 0.01 | 17.1 | 68.4 | 2.5 | Below detectable limits |
| 9 | 3.9 | 6.7 | 12.9 | 0.014 | 13 | 0.01 | 17.1 | 34.2 | 1.4 | Below detectable limits |
| 10 | 4.1 | 6.5 | 13.0 | 0.012 | 11 | 0.01 | 17.1 | 34.2 | 2.0 | Below detectable limits |
| BK1 | 4.8 | 6.6 | 12.4 | 0.014 | 13 | 0.01 | 17.1 | 34.2 | 2.4 | Below detectable limits |
| BK2 | 4.7 | 6.6 | 13.0 | 0.012 | 12 | 0.01 | 17.1 | 34.2 | 3.1 | Below detectable limits |
| BK3 | 4.3 | 6.5 | 12.6 | 0.012 | 11 | 0.01 | 17.1 | 51.3 | 2.3 | Below detectable limits |
| BKT1 | 3.3 | 6.7 | 13.5 | 0.015 | 14 | 0.01 | 17.1 | 34.2 | 2.6 | Below detectable limits |
| Optimal | > 0 | 6.5-8.5 | > 5 | > 0 | 100-400 | 0 | 100-400 | 100-400 | <10 | 0 |

Fish were found at all sites except for site 2 in the spring. During the summer data collection access to site 1 on Bear Kill, and the Bear Kill tributary could not be obtained. Site 2 and Site 10 were dry during the summer as well. Good numbers of both predators and prey were found at all other sites (Tables 2, 3).

**Table 2:** Fish Captured using backpack electrofisher on Manor Kill, Schoharie County, NY 4/27/08

| Species | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 | Site 6 | Site 7 | Site 8 | Site 9 | Site 10 | BK 1 | BK 2 | BK 3 | BKT 1 | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fathead Minnow | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| White Sucker | 4 | 0 | 1 | 2 | 0 | 5 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| Common Shiner | 7 | 0 | 0 | 3 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| Longnose Dace | 12 | 0 | 23 | 23 | 8 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 68 |
| Blacknose Dace | 96 | 0 | 104 | 110 | 4 | 91 | 80 | 3 | 1 | 1 | 4 | 5 | 10 | 0 | 509 |
| Creek Chub | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 8 |
| Slimy Sculpin | 0 | 0 | 0 | 17 | 15 | 3 | 1 | 32 | 62 | 0 | 3 | 46 | 11 | 11 | 201 |
| Brown Trout | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 3 | 7 | 0 | 4 | 7 | 2 | 1 | 28 |
| Brook Trout | 0 | 0 | 1 | 0 | 0 | 2 | 1 | 2 | 10 | 10 | 0 | 5 | 8 | 1 | 40 |
| Totals | 119 | 0 | 130 | 155 | 29 | 109 | 85 | 42 | 80 | 15 | 11 | 63 | 32 | 13 | 764 |

**Table 3:** Fish Captured using Backpack electrofisher on Manor Kill, Schoharie County, NY 9/15/08

| Species | Site 1 | Site 2 | Site 3 | Site 4 | Site 5 | Site 6 | Site 7 | Site 8 | Site 9 | Site 10 | BK 1 | BK 2 | BK 3 | BKT 1 | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brown Bullhead | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | | 0 | 0 | | 1 |
| Bluegill | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | 4 | 8 | | 12 |
| White Sucker | 1 | DRY | 6 | 2 | 0 | 3 | 36 | 1 | 0 | DRY | No Access | 0 | 0 | No Access | 49 |
| Common Shiner | 15 | | 12 | 10 | 13 | 41 | 92 | 3 | 0 | | | 0 | 0 | | 186 |
| Longnose Dace | 15 | | 30 | 27 | 19 | 2 | 0 | 0 | 0 | | | 0 | 0 | | 93 |
| Blacknose Dace | 142 | | 104 | 176 | 137 | 261 | 80 | 49 | 6 | | | 53 | 45 | | 1053 |
| Creek Chub | 14 | | 2 | 5 | 3 | 8 | 115 | 10 | 0 | | | 0 | 0 | | 157 |
| Slimy Sculpin | 0 | | 0 | 0 | 12 | 6 | 1 | 16 | 79 | | | 70 | 18 | | 202 |
| Brown Trout | 0 | | 2 | 2 | 1 | 10 | 4 | 9 | 10 | | | 21 | 5 | | 64 |
| Brook Trout | 0 | | 2 | 0 | 0 | 1 | 2 | 5 | 8 | | | 35 | 72 | | 125 |
| Totals | 187 | 0 | 158 | 222 | 185 | 332 | 330 | 93 | 104 | 0 | 0 | 183 | 148 | 0 | 1942 |

The trout that were captured ranged in size from 61mm to 414mm. Most of the trout caught were less than 200mm (Fig. 2,3)

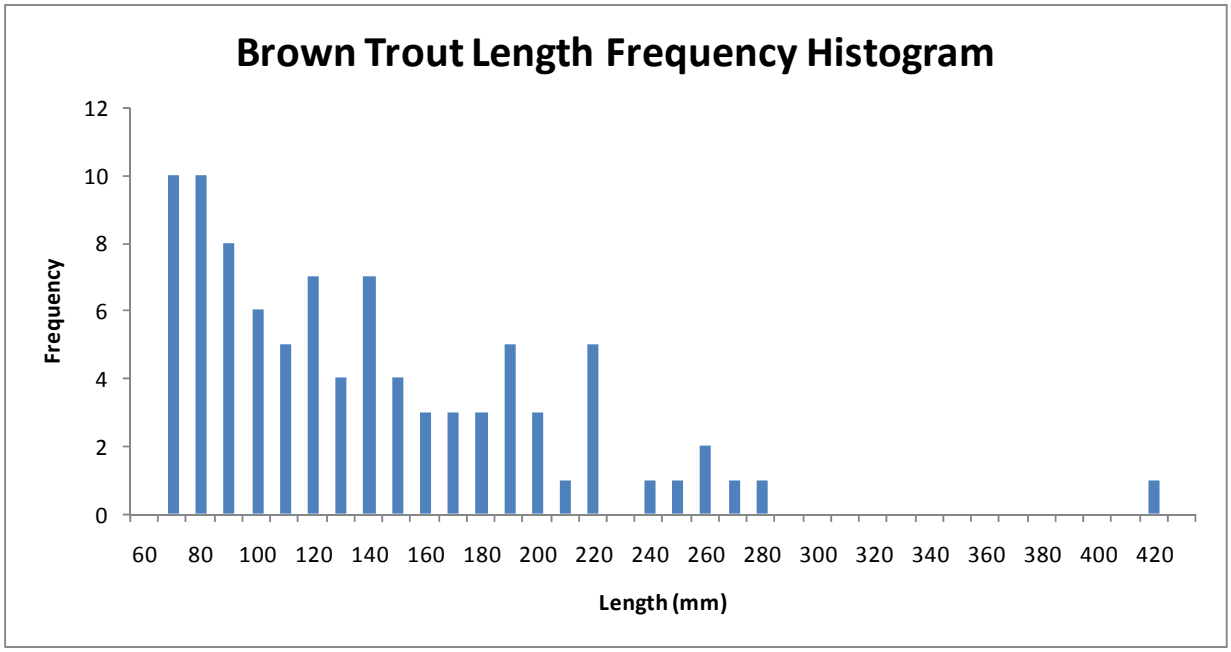


**Fig. 2:** Brown trout length frequency histogram from Manor Kill, Schoharie County, NY

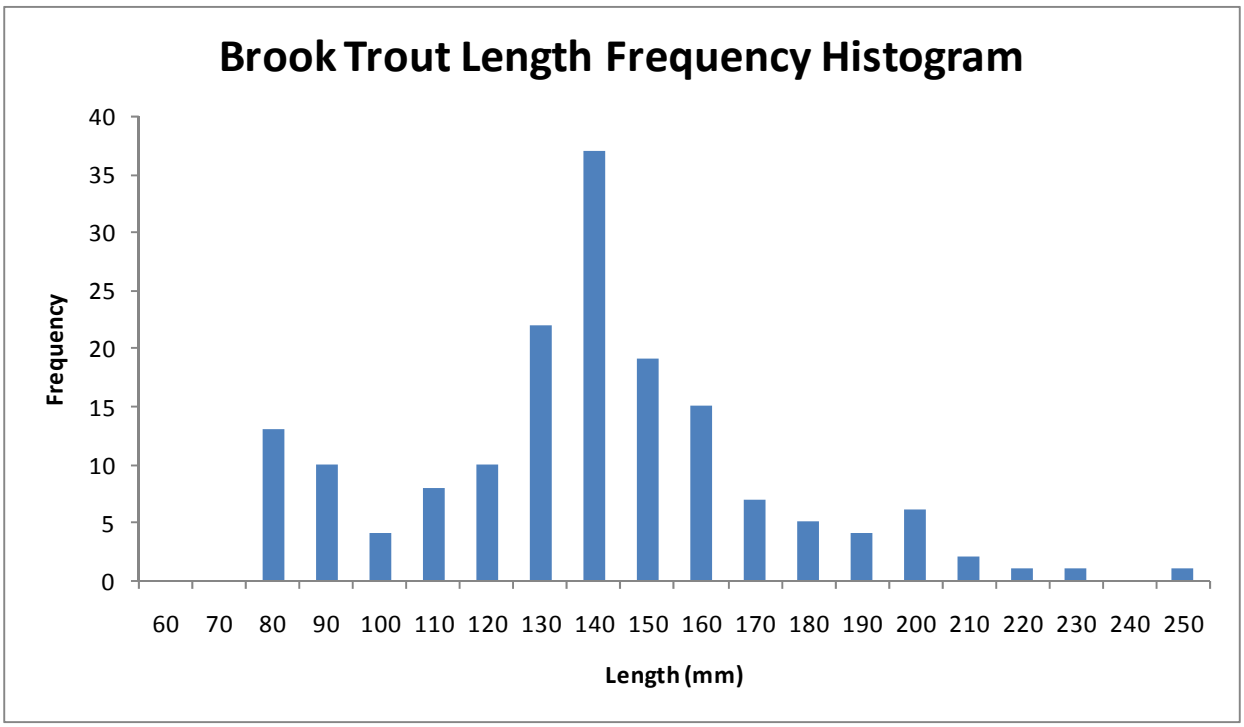


**Fig. 3:** Brook trout length frequency histogram from Manor Kill, Schoharie County, NY

## Conclusions

The findings of this study show that there are no major chemical or physical water parameters that would limit the presence of the fish species. The alkalinity and hardness were below optimal range, but this is expected with the high volumes of runoff due to snow melt in the spring.

The distribution of fish is common for small order streams such as the Manor Kill. There is more diversity in the middle stream section. The upper section is dominated by cold water species such as trout and sculpins. The lower stream reaches are dominated by cool water species like minnows. The only fish that did not fit this model are a Fathead Minnow (*Pimephaies promelas),* a Brown Bullhead (*Ameiurus nebulosus*), and a small number of Bluegill (*Lepomis macrochirus*). All of these fish are warmwater species that were most likely introduced by sport fisherman.

## Acknowledgements

We would like to thank Kevin Poole for his help in transportation, sampling, and his GIS imagery. The land owners for letting us have access to the stream. SUNY Cobleskill provided the equipment used. SUNY Cobleskill students who helped us sample. Town of Conesville who was the sponsor of this project.

# Macroinvertebrate Survey of the Manor Kill, Conesville, NY: Summer 2008

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**Abstract:** This study was conducted to determine a baseline of water quality assessment within the Manor Kill watershed. Macroinvertebrate indices along with water quality and physical parameters were used to assess biological impairments within the watershed. The results show a relatively stable watershed with an exception of the stream reach between Sites 5 and 7. The higher water temperatures (>20°C) along with the change in water quality impaction from slightly too moderately impacted has indicated there is reason to focus efforts on this stretch of stream. Further research should be conducted to determine practical applications for stream riparian zone restoration

## Introduction

The Manor Kill watershed is an important resource to the Town of Conesville, NY and the City of New York. It provides drinking water, an agriculture water supply, and supports fishing activities along its length. In recent years, the need to address water quality has become increasingly important.

However, little research has been done on the Manor Kill watershed. The NYS DEC has conducted studies in the past, but they have been limited. There has never been such a comprehensive study of this magnitude.

This study was conducted to determine a baseline of water quality assessment using multiple indices. These included water quality parameters, physical parameters, and macroinvertebrate indices.

## Materials and Methods

The Manor Kill is located in southern Schoharie County, New York State, in the foothills of the Catskill Mountains. This 2$^{nd}$ order stream empties into Schoharie Reservoir in the town of West Conesville. It mainly runs east to west with the Bear Kill tributary flowing in from the north. The stream can be reached from Rte. 30 by turning left on to State Route 990v.

The survey sites were selected based on a downstream/upstream water quality assessment for every major tributary located on the Manor Kill. These selections were based on the NYS DEC Stream Biomonitoring Unit's standard operating procedures for "Biological Impairment Criteria" (Bode et. al. 2002). Sites 8 and 10, on the Manor Kill and Bear Kill respectively, were the upper most sites that did not include a second site due to drought conditions. The following is a map of site locations within the Manor Kill watershed (Figure 1) along with Table 1 indicating GPS coordinates of the survey sites.

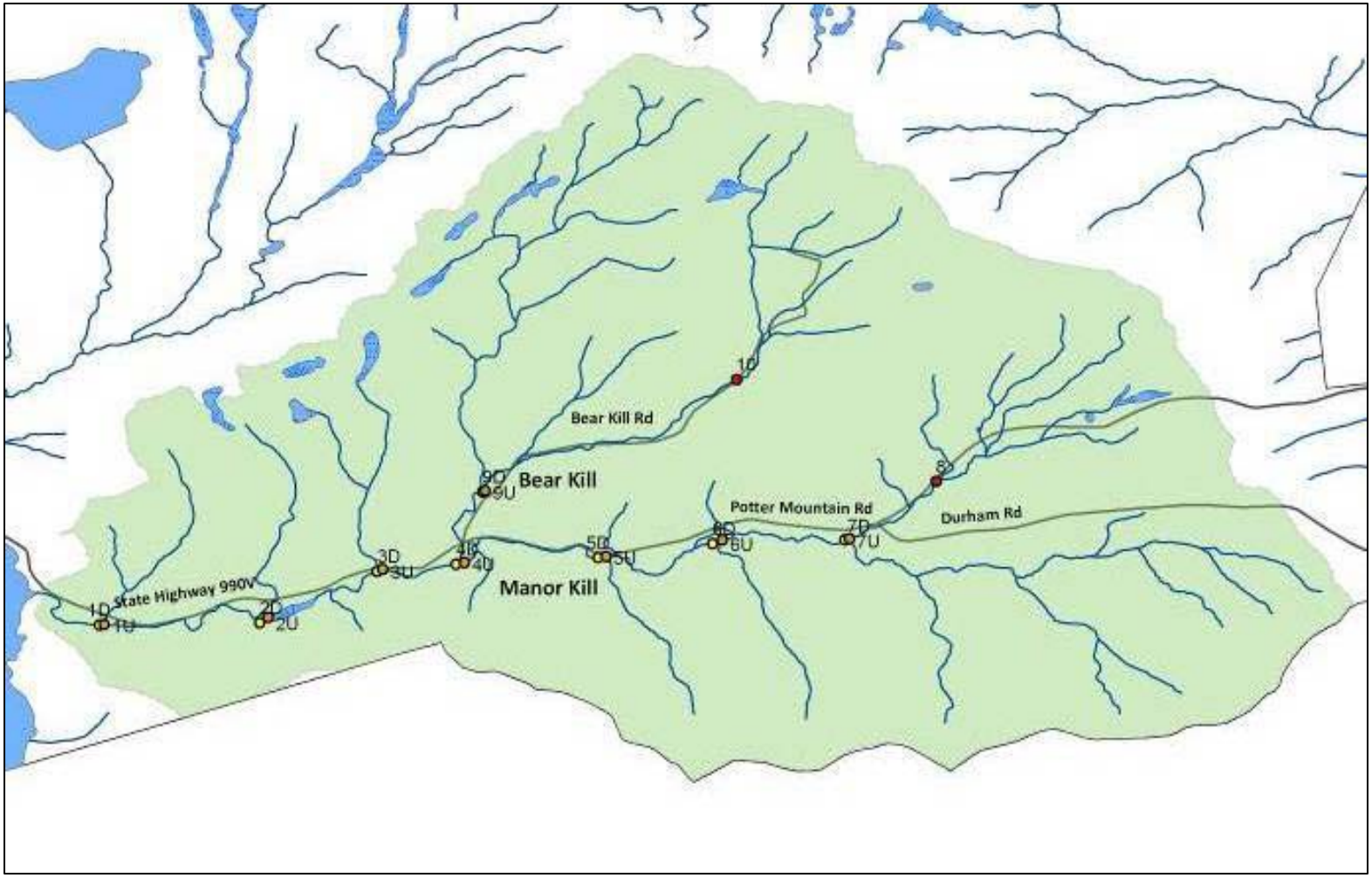


**Figure 1***: Map of the macroinvertebrate survey sites within the Manor Kill watershed: Summer 2008*

**Table 1:** GPS coordinates of the macroinvertebrate survey sites within the Manor Kill watershed: Summer 2008

| Site | Water | Latitude | Longitude |
|---|---|---|---|
| 1D | Manor Kill | 42.376222 | -74.423717 |
| 1U | Manor Kill | 42.376292 | -74.423017 |
| 2D | Manor Kill | 42.376502 | -74.402715 |
| 2U | Manor Kill | 42.377237 | -74.401700 |
| 3D | Manor Kill | 42.383222 | -74.387383 |
| 3U | Manor Kill | 42.383502 | -74.386683 |
| 4D | Manor Kill | 42.384167 | -74.377093 |
| 4U | Manor Kill | 42.384378 | -74.376007 |
| 5D | Manor Kill | 42.384973 | -74.358541 |
| 5U | Manor Kill | 42.385148 | -74.357526 |
| 6D | Manor Kill | 42.386828 | -74.343594 |
| 6U | Manor Kill | 42.387318 | -74.342369 |
| 7D | Manor Kill | 42.387283 | -74.326338 |
| 7U | Manor Kill | 42.387493 | -74.325778 |
| 8 | Manor Kill | 42.394983 | -74.314437 |
| 9D | Bear Kill | 42.393618 | -74.373662 |
| 9U | Bear Kill | 42.393758 | -74.373312 |
| 10 | Bear Kill | 42.408320 | -74.340444 |

The sampling was done in the summer of 2008 on July 8$^{th}$ and 9$^{th}$. The weather was partly cloudy with air temperatures ranging from low 80's to low 90's °F. The stream discharge conditions during the survey were below normal. It had not rained for weeks prior to the survey.

Initially, basic water quality parameters were taken at each site using an YSI 556 water analyzer which included temperature, conductivity, dissolved oxygen, and pH. Next, a standardized kick net (800 x 900µm) was used to sample macroinvertebrates within riffles for a length of five meters. The kick netter stood upstream of the net, kicking the substrate while moving downstream the length of the site for five minutes (Bode 2004). This was repeated at the upstream and downstream site of each tributary. Once these samples were collected, they were preserved in ethyl alcohol to be sorted back at the lab to their lowest taxa possible using a taxonomic key (Merritt et. al. 2008). Each taxa were then weighted using digital scale. Furthermore, physical parameters were taken at each site which included stream width, depth, velocity, embeddness, canopy cover, and substrate type.

## Results

**Table 2:** Water quality parameters taken at each survey site within the Manor Kill watershed: Summer 2008.

| Date | Time (mil) | Site | Velocity (ft/sec) | Temp (°C) | D.O. (mg/L) | pH | Conductivity (µs/cm) |
|---|---|---|---|---|---|---|---|
| 07/08/08 | 9:25 | 1D | 1.5 | 19.5 | 6.5 | 8.2 | 59 |
| 07/08/08 | 9:30 | 1U | 3.5 | 19.4 | 5.8 | 7.8 | 58 |
| 07/08/08 | 10:30 | 2D | 4.0 | 20.1 | 4.7 | 7.5 | 53 |
| 07/08/08 | 10:45 | 2U | 4.0 | 20.5 | 5.6 | 7.3 | 54 |
| 07/08/08 | 11:25 | 3D | 2.5 | 21.5 | 6.4 | 7.9 | 51 |
| 07/08/08 | 11:40 | 3U | 4.0 | 21.3 | 5.1 | 8.1 | 50 |
| 07/08/08 | 12:40 | 4D | 3.0 | 19.9 | 5.9 | 7.5 | 45 |
| 07/08/08 | 12:55 | 4U | 2.5 | 20.6 | 6.9 | 7.7 | 49 |
| 07/08/08 | 13:20 | 5D | 1.5 | 22.5 | 6.1 | 7.4 | 44 |
| 07/08/08 | 13:40 | 5U | 1.0 | 22.1 | 6.3 | 7.2 | 41 |
| 07/09/08 | 9:20 | 6D | 2.0 | 15.7 | 7.1 | 6.3 | 33 |
| 07/09/08 | 9:40 | 6U | 2.0 | 15.5 | 6.2 | 6.7 | 30 |
| 07/08/08 | 14:15 | 7D | 0.3 | 15.3 | 6.9 | 7.1 | 50 |
| 07/08/08 | 14:30 | 7U | 1.0 | 16.4 | 7.3 | 6.9 | 49 |
| 07/09/08 | 10:35 | 8 | 2.0 | 13.3 | 7.1 | 7.8 | 32 |
| 07/09/08 | 11:50 | 9D | 1.5 | 17.2 | 5.7 | 7.2 | 37 |
| 07/09/08 | 12:05 | 9U | 2.0 | 18.8 | 5.6 | 7.6 | 39 |
| 07/09/08 | 12:40 | 10 | 1.0 | 17.3 | 5.4 | 7.5 | 32 |

For the most part, water quality remained relatively constant throughout the Manor Kill watershed (Table 2). However, the water temperature hovered around the stress threshold (20°C) for trout species in the lower half of the watershed, particularly at Site 5. Furthermore, the conductivity was low throughout the watershed, indicating low nutrient levels. All other water quality parameters were within optimal range.

**Table 3:** Physical parameters taken at each survey site within the Manor Kill watershed: Summer 2008.

| Site | Stream Width (m) | Stream Depth (mm) | Embeddedness (%) | Canopy (%) | Substrate Type |
|---|---|---|---|---|---|
| 1D | 11.2 | 160 | 10 | 20 | Rock |
| 1U | 7.7 | 170 | 10 | 30 | Rock |
| 2D | 3.5 | 160 | 40 | 10 | Rubble/Gravel |
| 2U | 3.3 | 140 | 10 | 0 | Rubble |
| 3D | 4.6 | 130 | 10 | 30 | Rock/Rubble |
| 3U | 3.8 | 230 | 30 | 30 | Rubble |
| 4D | 6.7 | 120 | 10 | 10 | Rock |
| 4U | 2.9 | 110 | 20 | 50 | Rock/Rubble |
| 5D | 4.5 | 60 | 35 | 0 | Gravel |
| 5U | 3.4 | 190 | 40 | 0 | Rubble/Gravel |
| 6D | 2.5 | 100 | 25 | 0 | Gravel |
| 6U | 2.3 | 80 | 20 | 0 | Gravel |
| 7D | 1.5 | 40 | 40 | 40 | Rock/Rubble |
| 7U | 4.0 | 70 | 20 | 50 | Rock/Rubble |
| 8 | 3.7 | 85 | 15 | 80 | Rock |
| 9D | 4.8 | 70 | 10 | 60 | Rubble |
| 9U | 2.3 | 70 | 30 | 30 | Rubble |
| 10 | 2.7 | 60 | 10 | 95 | Rock |

The embeddedness (measure of how deeply rocks are buried in the stream substrate) was, for the most part, higher around Sites 5-7 (Table 3). The substrate at these sites was typically of a gravel consistency. Furthermore, the canopy was completely absent from Sites 5 and 6. These physical parameters show below optimal characteristics for this reach of the watershed.

**Table 4:** Macroinvertebrate indices for the Manor Kill watershed: Summer 2008.

| Site | Species Richness | EPT Richness | EPT Index (% by Weight) | Hilsenhoff Biotic Index | Percent Model Affinity |
|---|---|---|---|---|---|
| 1D | 18 | 10 | 38 | 4.11 | 63 |
| 1U | 20 | 11 | 54 | 4.75 | 75 |
| 2D | 15 | 7 | 39 | 4.48 | 61 |
| 2U | 11 | 8 | 52 | 3.42 | 60 |
| 3D | 18 | 10 | 50 | 2.99 | 70 |
| 3U | 18 | 10 | 92 | 3.07 | 50 |
| 4D | 12 | 6 | 16 | 4.60 | 78 |
| 4U | 17 | 10 | 83 | 3.81 | 56 |
| 5D | 11 | 5 | 61 | 2.95 | 61 |
| 5U | 14 | 7 | 31 | 5.74 | 42 |
| 6D | 8 | 6 | 24 | 4.96 | 48 |
| 6U | 7 | 5 | 71 | 4.08 | 39 |
| 7D | 4 | 2 | 98 | 4.00 | 15 |
| 7U | 13 | 10 | 52 | 2.28 | 67 |
| 8 | 12 | 9 | 66 | 1.74 | 62 |
| 9D | 15 | 11 | 56 | 3.96 | 56 |
| 9U | 11 | 8 | 99 | 2.47 | 61 |
| 10 | 11 | 9 | 98 | 3.26 | 57 |

The water quality indices calculated above (Table 4), were based from NYS DEC Stream Biomonitoring Unit's Biological Assessment Profile (Bode et. al. 2002). These are common macroinvertebrate community indices used to indicate water quality impact statuses. Furthermore, the EPT Index calculated by taxa weight (Appendix I), was included to show that all sites had high abundances of EPT organisms. EPT represents orders of Ephemeroptera, Plecoptera, and Trichoptera which typically indicates healthier water quality conditions.

**Table 5:** Macroinvertebrate water quality impact scores for the Manor Kill: Summer 2008.

| Site | WQ Scores | WQ Impact |
|---|---|---|
| 1D | 7.1 | Slightly Impacted |
| 1U | 7.2 | Slightly Impacted |
| 2D | 6.0 | Slightly Impacted |
| 2U | 5.9 | Slightly Impacted |
| 3D | 7.4 | Slightly Impacted |
| 3U | 6.7 | Slightly Impacted |
| 4D | 5.9 | Slightly Impacted |
| 4U | 6.6 | Slightly Impacted |
| 5D | 5.7 | Slightly Impacted |
| 5U | 4.9 | Moderately Impacted |
| 6D | 4.7 | Moderately Impacted |
| 6U | 4.4 | Moderately Impacted |
| 7D | 3.2 | Moderately Impacted |
| 7U | 7.0 | Slightly Impacted |
| 8 | 6.5 | Slightly Impacted |
| 9D | 6.4 | Slightly Impacted |
| 9U | 6.3 | Slightly Impacted |
| 10 | 5.8 | Slightly Impacted |

The results of the water quality scores indicate that most of the Manor Kill watershed had slightly impacted water quality. However, Sites 5-7 indicates that there was moderately impacted water quality at this reach of the watershed.

## Discussion

This survey was conducted to determine a baseline for water quality within Manor Kill watershed. The results are significant showing a relatively stable watershed with an exception of the stream reach between Sites 5 and 7.

The higher water temperatures (>20°C) along with the change in water quality impaction from slightly too moderately impacted has indicated there is reason to focus efforts on this stretch of stream. Also, the macroinvertebrate species richness and EPT richness drops significantly. The lack of canopy corresponding with a poor riparian zone increases the chance of more sedimentary input into the stream which is shown by an increase of gravel substrate and embeddedness.

The Manor Kill between Sites 5 and 7 shows the most altered conditions relating to stream side activities. This stretch consists of farm fields extending into the riparian zones and a rock quarry just upstream. These conditions could contribute to the degraded water quality conditions found along this stretch during the study.

Further research should be conducted to determine practical applications for stream riparian zone restoration. The continued degradation along this stretch on the Manor Kill could lead to more complicated remedies in the future.

# Appendix I

**Table 6:** Macroinvertebrate taxa found at each survey site on the Manor Kill: Summer 2008.

| Site | Order | Suborder | Family | Subfamily | Genus | Species | Count | Weight (gm) |
|---|---|---|---|---|---|---|---|---|
| 1D | Coleoptera | | Psephenidae | | Psephenus | | 24 | 0.09 |
| 1D | Coleoptera | | Elmidae | | | | 13 | 0.02 |
| 1D | Diptera | | Tipulidae | | Hexatoma | | 17 | 2.00 |
| 1D | Diptera | | Tipulidae | | Antocha | | 1 | 0.01 |
| 1D | Diptera | | Tipulidae | | | | 7 | 0.01 |
| 1D | Diptera | | Chironomidae | | | | 18 | 0.02 |
| 1D | Diptera | | Chironomidae | | | | 3 | 0.01 |
| 1D | Ephemeroptera | | Leptohyphidae | | | | 4 | 0.02 |
| 1D | Ephemeroptera | | Oligoneuriidae | | | | 5 | 0.03 |
| 1D | Ephemeroptera | | Neoephemeridae | | | | 2 | 0.01 |
| 1D | Ephemeroptera | | Baetidae | | | | 1 | 0.02 |
| 1D | Ephemeroptera | | Baetidae | | | | 2 | 0.01 |
| 1D | Megaloptera | | Corydalidae | | Nigronia | | 1 | 0.02 |
| 1D | Plecoptera | | Leuctridae | | | | 2 | 0.01 |
| 1D | Plecoptera | | Perlidae | | Claasenia | | 11 | 0.85 |
| 1D | Trichoptera | | Hydropsychidae | | Hydropsyche | | 6 | 0.08 |
| 1D | Trichoptera | | Polycentropodidae | | Nyctiophylax | | 3 | 0.28 |
| 1D | Trichoptera | | Polycentropodidae | | Neuroclpsis | | 3 | 0.01 |
| 1U | Coleoptera | | Psephenidae | | Dicranopsclaphus | | 2 | 0.01 |
| 1U | Coleoptera | | Elmidae | | | | 7 | 0.01 |
| 1U | Coleoptera | | Scirtidae | | | | 1 | 0.01 |
| 1U | Decapoda | | Cambaridae | Cambarinae | Orconectes | rusticus | 1 | 0.24 |
| 1U | Diptera | Brachycera | Cyclorrhaphous | | | | 6 | 0.01 |
| 1U | Diptera | Brachycera | Orthorrhaphous | | | | 7 | 0.01 |
| 1U | Diptera | | Chironomidae | | | | 11 | 0.01 |
| 1U | Ephemeroptera | | Potamanthidae | | Anthopotamus | | 2 | 0.01 |
| 1U | Ephemeroptera | | Baetiscidae | | | | 4 | 0.01 |
| 1U | Ephemeroptera | | Leptohyphidae | | | | 3 | 0.03 |
| 1U | Ephemeroptera | | Baetidae | | | | 5 | 0.02 |
| 1U | Ephemeroptera | | Ameletidae | | Ameletus | | 1 | 0.01 |
| 1U | Ephemeroptera | | Leptophlepiidae | | Traverella | | 1 | 0.01 |
| 1U | Megloptera | | Corydalidae | | Corydalus | Latreille | 1 | 0.08 |
| 1U | Odonota | Anisoptera | Libellulidae | | Erythemis | | 1 | 0.07 |
| 1U | Plecoptera | | Pteronarcyidae | | Pteronarcella | badia | 1 | 0.05 |
| 1U | Plecoptera | | Perlidae | | | | 1 | 0.01 |
| 1U | Trichoptera | | Hydroptilidae | | Hydroptilla | | 4 | 0.02 |
| 1U | Trichoptera | | Phryganeidae | | | | 3 | 0.02 |
| 1U | Trichoptera | | Polycentropodidae | | | | 3 | 0.01 |

| Site | Order | Suborder | Family | Subfamily | Genus | Species | Count | Weight (gm) |
|---|---|---|---|---|---|---|---|---|
| 2D | Coleoptera | | Eluichadidae | | Stenocolus | | 2 | 0.02 |
| 2D | Coleoptera | | Ptilodactylidae | | Anchytarsas | | 2 | 0.01 |
| 2D | Coleoptera | | Elmidae | | | | 17 | 0.01 |
| 2D | Diptera | | Tipuldidae | | Hexatoma | | 11 | 2.49 |
| 2D | Diptera | Nematocera | Blephariceridea | | Blepharicera | Marcquart | 3 | 0.37 |
| 2D | Diptera | Nomatocera | Chironomidae | Pentoneurini | | | 12 | 0.02 |
| 2D | Ephemeroptera | | Baetidae | | | | 12 | 0.07 |
| 2D | Ephemeroptera | | Baetisidae | | Baetisca | | 1 | 0.01 |
| 2D | Ephemeroptera | | Potamanthidae | | Anthopotomas | | 1 | 0.03 |
| 2D | Megaloptera | | Corydalidae | | Chauliodes | Latreille | 2 | 0.17 |
| 2D | Odonata | | Coenagrionidae | | Amphiagrion | | 5 | 0.30 |
| 2D | Plecoptera | | Perlidae | | Claassenio | | 3 | 0.15 |
| 2D | Trichoptera | | Polycentropodidae | | Neureclipsis | | 17 | 0.39 |
| 2D | Trichoptera | | Limnephilidae | | | | 6 | 0.66 |
| 2D | Trichoptera | | Brachycentridae | | | | 1 | 0.08 |
| 2U | Coleoptera | | Psephenidae | | Psephenus | | 2 | 0.03 |
| 2U | Coleoptera | | Elmidae | | | | 12 | 0.01 |
| 2U | Diptera | | Tipulidae | | Hexatoma | | 7 | 2.30 |
| 2U | Ephemeroptera | | Baetidae | | | | 8 | 0.11 |
| 2U | Ephemeroptera | | Leptohyphidae | | | | 24 | 1.09 |
| 2U | Ephemeroptera | | Heptageniidae | | | | 1 | 0.03 |
| 2U | Plecoptera | | Perlidae | | Claassenia | | 6 | 0.04 |
| 2U | Plecoptera | | Perlidae | | Perlesta | | 1 | 0.01 |
| 2U | Trichoptera | | Polycentropodidae | | Nyctiophylax | | 1 | 0.10 |
| 2U | Trichoptera | | Polycentropodidae | | Neuroeclipsis | | 4 | 0.05 |
| 2U | Trichoptera | | Hydropsychidae | | Hydropsyche | | 47 | 1.09 |
| 3D | Coleoptera | | Psephenidae | | Psephenus | | 1 | 0.01 |
| 3D | Coleoptera | | Elmidae | | | | 3 | 0.02 |
| 3D | Decapoda | | Cambaridae | Cambarinae | Orconectes | rusticus | 1 | 6.03 |
| 3D | Ephemeroptera | | Polymitarcyidae | | Ephoron | | 3 | 1.71 |
| 3D | Ephemeroptera | | Baetidae | | | | 7 | 0.03 |
| 3D | Ephemeroptera | | Leptohyhidae | | | | 17 | 0.04 |
| 3D | Diptera | | Tipulidae | | Hexatoma | | 1 | 0.07 |
| 3D | Diptera | | Chironomidae | | | | 6 | 0.07 |
| 3D | Diptera | | Tipulidae | | Antocha | | 3 | 0.23 |
| 3D | Megaloptera | | Corydatidae | | Nigroriia | | 1 | 0.26 |
| 3D | Odonata | Anisoptera | Gomphidae | | Stylogompnus | | 2 | 0.21 |
| 3D | Plecoptera | | Perlidae | | Claassenia | | 13 | 0.75 |
| 3D | Plecoptera | | Pteronarcyidae | | Pteronarcys | | 3 | 0.57 |
| 3D | Plecoptera | | Chloroperlidae | | | | 3 | 0.03 |
| 3D | Trichoptera | | Hydropsychidae | | Hydropsyche | | 11 | 0.21 |
| 3D | Trichoptera | | Polycentripodidae | | Neureclipsis | | 3 | 0.03 |
| 3D | Trichoptera | | Limnephilidae | | | | 1 | 0.87 |
| 3D | Trichoptera | | Limnephilidae | | | | 3 | 0.93 |

| Site | Order | Suborder | Family | Subfamily | Genus | Species | Count | Weight (gm) |
|---|---|---|---|---|---|---|---|---|
| 3U | Coleoptera | | Psephenidae | | Psephenus | | 3 | 0.02 |
| 3U | Coleoptera | | Elmidae | | | | 1 | 0.01 |
| 3U | Decapoda | | Cambaridae | Cambarinae | Orconectes | rusticus | 1 | 0.03 |
| 3U | Diptera | | Tipulidae | | Hexatoma | | 16 | 0.04 |
| 3U | Diptera | | Chironomidae | | | | 4 | 0.06 |
| 3U | Diptera | | Tipulidae | | Antocha | | 2 | 0.19 |
| 3U | Ephemeroptera | | Polymitarcyidae | | Ephoron | | 1 | 1.62 |
| 3U | Ephemeroptera | | Baetidae | | | | 3 | 0.02 |
| 3U | Ephemeroptera | | Leptohyhidae | | | | 12 | 0.02 |
| 3U | Odonata | Anisoptera | Gomphidae | | Stylogomphus | | 2 | 0.21 |
| 3U | Odonata | Anisoptera | Gomphidae | | Lanthus | | 6 | 0.03 |
| 3U | Plecoptera | | Perlidae | | Claassenia | | 9 | 0.67 |
| 3U | Plecoptera | | Pteronarcyidae | | Pteronarcys | | 3 | 0.97 |
| 3U | Plecoptera | | Chloroperlidae | | | | 1 | 0.02 |
| 3U | Trichoptera | | Hydropsychidae | | Hydropsyche | | 21 | 0.54 |
| 3U | Trichoptera | | Polycentripodidae | | Neureclipsis | | 5 | 0.05 |
| 3U | Trichoptera | | Limnephilidae | | | | 3 | 1.12 |
| 3U | Trichoptera | | Limnephilidae | | | | 2 | 0.29 |
| 4D | Coleoptera | | Elaichadidae | | Stenocolas | | 4 | 0.02 |
| 4D | Coleoptera | | Elmidae | | | | 3 | 0.01 |
| 4D | Coleoptera | | Scirtidae | | | | 4 | 0.02 |
| 4D | Diptera | | Tipulidae | | Hexatoma | | 6 | 1.25 |
| 4D | Diptera | Nematocera | Chironomidae | Pentanearini | | | 31 | 0.03 |
| 4D | Ephemeroptera | | Baetidae | | | | 17 | 0.08 |
| 4D | Ephemeroptera | | Potomanthidae | | Anthopotama | | 2 | 0.02 |
| 4D | Ephemeroptera | | Leptohyhidae | | | | 1 | 0.01 |
| 4D | Megaloptera | | Corydalidae | | Chauliodes | Lateille | 2 | 0.04 |
| 4D | Plecoptera | | Perlidae | | Classenia | | 4 | 0.03 |
| 4D | Trichoptera | | Polycentropodidae | | Neuroclipsis | | 2 | 0.03 |
| 4D | Trichoptera | | Hydropsychidae | | | | 4 | 0.05 |
| 4U | Coleoptera | | Psephenidae | | Psephenus | | 5 | 0.04 |
| 4U | Coleoptera | | Scirtidae | | | | 2 | 0.02 |
| 4U | Diptera | | Chironomidae | | | | 2 | 0.01 |
| 4U | Diptera | | Tipulidae | | Hexatoma | | 4 | 0.37 |
| 4U | Diptera | | Tipulidae | | Antocha | | 1 | 0.01 |
| 4U | Ephemeroptera | | Baetidae | | | | 3 | 0.01 |
| 4U | Ephemeroptera | | Oligoneuridae | | | | 4 | 0.03 |
| 4U | Ephemeroptera | | Leptohyphidae | | | | 13 | 0.11 |
| 4U | Ephemeroptera | | Heptageniidae | | | | 1 | 0.01 |
| 4U | Megaloptera | | Corydalidae | | Nigronia | | 3 | 0.06 |
| 4U | Megaloptera | | Corydatidae | | Nigronia | | 1 | 0.04 |
| 4U | Plecoptera | | Perlidae | | Classesnia | | 9 | 0.91 |
| 4U | Tricoptera | | Polycentropodidae | | Neureclipsis | | 19 | 0.14 |
| 4U | Tricoptera | | Glossosomatidae | | | | 1 | 0.08 |
| 4U | Tricoptera | | Hydropsychidae | | Hydropsyche | | 23 | 0.56 |
| 4U | Tricoptera | | Polycentropodidae | | Nytiophylax | | 3 | 0.23 |
| 4U | Tricoptera | | Limnephilidae | | | | 2 | 0.03 |

| Site | Order | Suborder | Family | Subfamily | Genus | Species | Count | Weight (gm) |
|---|---|---|---|---|---|---|---|---|
| 5D | Coleoptera | | Psephenidae | | Psephenus | | 1 | 0.01 |
| 5D | Coleoptera | | Elmidae | | | | 1 | 0.01 |
| 5D | Diptera | | Tipulidae | | Hexatoma | | 8 | 0.37 |
| 5D | Diptera | | Chironomidae | | | | 4 | 0.01 |
| 5D | Diptera | | Tipulidae | | Antocha | | 27 | 0.04 |
| 5D | Ephemeroptera | | Leptohyphidae | | | | 22 | 0.28 |
| 5D | Ephemeroptera | | Baetidae | | | | 3 | 0.02 |
| 5D | Odonata | Anisoptera | Gomphidae | | | | 2 | 0.24 |
| 5D | Plecoptera | | Perlidae | | Claassenia | | 3 | 0.09 |
| 5D | Plecoptera | | Leuctridae | | | | 1 | 0.01 |
| 5D | Tricoptera | | Hydropsychidea | | Hydropsyche | | 14 | 0.05 |
| 5U | Decapoda | | Cambaridae | Cambarinae | Orconectes | | 2 | 0.42 |
| 5U | Diptera | | Tipulidae | | Hexatoma | | 2 | 0.25 |
| 5U | Diptera | Nematocera | Chironomidae | Pentaneurini | | | 63 | 0.10 |
| 5U | Ephemeroptera | | Euthyplociidae | | Euthyplecia | Hecuba | 1 | 0.05 |
| 5U | Ephemeroptera | | Polymitarcyidae | | Ephoron | | 1 | 0.01 |
| 5U | Ephemeroptera | | Potamanthidae | | Anthopotamus | | 1 | 0.02 |
| 5U | Ephemeroptera | | Baetidae | | | | 4 | 0.02 |
| 5U | Ephemeroptera | | Leptohyphidae | | | | 1 | 0.03 |
| 5U | Megaloptera | | Corrdalidae | | Chaaliodes | Latreille | 1 | 0.02 |
| 5U | Odonata | | Coenagrionidae | | Chromagrion | | 1 | 0.12 |
| 5U | Odonata | | Coenagrionidae | | Telebasis | | 1 | 0.03 |
| 5U | Odonata | | Coenagrionidae | | Enallagmo | | 1 | 0.02 |
| 5U | Plecoptera | | Perlidae | | Classenia | | 1 | 0.01 |
| 5U | Trichoptera | | Polycentropodidae | | Neureclipsis | | 1 | 0.01 |
| 6D | Diptera | | Tipulidae | | Hexatoma | | 10 | 0.88 |
| 6D | Diptera | | Chironomidae | Pentaneurini | | | 73 | 0.07 |
| 6D | Ephemeroptera | | Baetidae | | | | 7 | 0.04 |
| 6D | Ephemeroptera | | Ephomerellidae | | Attenella | | 3 | 0.02 |
| 6D | Plecoptera | | Perlidae | | Aceroneuria | | 1 | 0.15 |
| 6D | Plecoptera | | Leuctridae | | Perlomyia | | 7 | 0.01 |
| 6D | Trichoptera | | Hydropsychidea | | Hydropsyche | | 1 | 0.01 |
| 6D | Trichoptera | | Polycentropodidae | | | | 2 | 0.07 |
| 6U | Diptera | Nematocera | Chironemidae | Pentaneurini | | | 38 | 0.04 |
| 6U | Diptera | | Tipulidae | | Hexatoma | | 1 | 0.01 |
| 6U | Ephemeroptera | | Leptophlebiidae | | | | 4 | 0.03 |
| 6U | Ephemeroptera | | Baetidae | | | | 1 | 0.03 |
| 6U | Ephemeroptera | | Baetiscidae | | Baetisca | | 1 | 0.02 |
| 6U | Plecoptera | | Leuctridae | | Perlomyia | | 16 | 0.03 |
| 6U | Trichoptera | | Polycentropodidae | | | | 1 | 0.01 |
| 7D | Diptera | Nematocera | Tipulidae | | Hexatoma | | 2 | 0.34 |
| 7D | Diptera | | Chironomidae | Pentaneurini | | | 2 | 0.01 |
| 7D | Ephemeroptera | | Leptohyphidae | | | | 1 | 0.02 |
| 7D | Tricoptera | | Limnephilidae | | | | 107 | 22.41 |

| Site | Order | Suborder | Family | Subfamily | Genus | Species | Count | Weight (gm) |
|---|---|---|---|---|---|---|---|---|
| 7U | Coleoptera | | Elmidae | | | | 1 | 0.01 |
| 7U | Diptera | | Tipulidae | | Hexatoma | | 11 | 1.03 |
| 7U | Diptera | | Chironomidae | | | | 1 | 0.01 |
| 7U | Ephemeroptera | | Baetidae | | | | 8 | 0.03 |
| 7U | Ephemeroptera | | Leptohyphidae | | | | 28 | 0.21 |
| 7U | Ephemeroptera | | Neoephemeridae | | | | 1 | 0.01 |
| 7U | Ephemeroptera | | Heptageniidae | | | | 1 | 0.01 |
| 7U | Plecoptera | | Perlidae | | Claassenia | | 10 | 0.43 |
| 7U | Plecoptera | | Pteronareyidae | | Pteronarcys | | 2 | 0.22 |
| 7U | Plecoptera | | Leuctridae | | | | 14 | 0.03 |
| 7U | Tricoptera | | Hydropsychidae | | Hydropsyche | | 7 | 0.13 |
| 7U | Tricoptera | | Piolycentropodidae | | Neureclipsis | | 4 | 0.02 |
| 7U | Tricoptera | | Phryganeidae | | | | 2 | 0.06 |
| 8 | Coleoptera | | Elmidae | | | | 3 | 0.01 |
| 8 | Diptera | | Tipulidae | | | | 4 | 0.86 |
| 8 | Diptera | | Tipulidae | | | | 1 | 0.01 |
| 8 | Ephemeroptera | | Ephemerellidae | | | | 25 | 0.09 |
| 8 | Ephemeroptera | | Baetidae | | | | 9 | 0.04 |
| 8 | Ephemeroptera | | Leptophlebiidae | | | | 1 | 0.01 |
| 8 | Plecoptera | | Pteronerctidae | | Pteronarcys | | 7 | 0.82 |
| 8 | Plecoptera | | Perlidae | | Claassenia | | 15 | 0.50 |
| 8 | Plecoptera | | Leuctridae | | | | 10 | 0.01 |
| 8 | Plecoptera | | Perlodidae | | | | 7 | 0.02 |
| 8 | Tricoptera | | Hydropsychidae | | Hydropsyche | | 5 | 0.10 |
| 8 | Tricoptera | | Limnephilidae | | | | 3 | 0.14 |
| 9D | Coleoptera | | Eulichadidae | | Stenocolas | | 2 | 0.01 |
| 9D | Coleoptera | | Elmidae | | | | 1 | 0.05 |
| 9D | Diptera | | Tipulidae | | Hexatoma | | 5 | 1.11 |
| 9D | Diptera | | Chironomidae | | | | 7 | 0.01 |
| 9D | Ephemeroptera | | Ephemerellidae | | Attenella | | 13 | 0.10 |
| 9D | Ephemeroptera | | Leptophelbiidae | | | | 2 | 0.01 |
| 9D | Ephemeroptera | | Baetidae | | | | 1 | 0.01 |
| 9D | Plecoptera | | Perlidae | | | | 8 | 0.42 |
| 9D | Plecoptera | | Pteronarcyidae | | Pteronarcys | | 2 | 0.37 |
| 9D | Tricoptera | | Polycentropodidae | | Nyctiophylax | | 2 | 0.19 |
| 9D | Tricoptera | | Hydropsychidae | | Hydropsyche | | 1 | 0.02 |
| 9D | Tricoptera | | Polycentropodidae | | Neureclipsis | | 21 | 0.04 |
| 9D | Tricoptera | | Leuctridae | | Perlomyia | | 1 | 0.03 |
| 9D | Tricoptera | | Polycentropodidae | | Cyrennclus | | 6 | 0.21 |
| 9D | Tricoptera | | Limnephilidae | | | | 3 | 0.13 |

| Site | Order | Suborder | Family | Subfamily | Genus | Species | Count | Weight (gm) |
|---|---|---|---|---|---|---|---|---|
| 9U | Diptera | | Tipulidae | | | | 2 | 0.01 |
| 9U | Diptera | | Chironomidae | | | | 3 | 0.01 |
| 9U | Ephemeroptera | | Baetidae | | | | 4 | 0.03 |
| 9U | Ephemeroptera | | Ephemerellidae | | | | 61 | 0.65 |
| 9U | Ephemeroptera | | Leptophlebiidae | | | | 2 | 0.01 |
| 9U | Ephemeroptera | | Ephemerellidae | | Attenella | | 7 | 0.09 |
| 9U | Megaloptera | | Corydatidae | | Nigronia | | 1 | 0.06 |
| 9U | Plecoptera | | Perlidae | | Claassenia | | 4 | 0.20 |
| 9U | Plecoptera | | Leuctridae | | | | 3 | 0.02 |
| 9U | Tricoptera | | Polycentropodidae | | Neuroclipsis | | 22 | 0.05 |
| 9U | Tricoptera | | Hydropsychidae | | Hydropsyche | | 7 | 0.24 |
| 10 | Coleoptera | | Scirtidae | | | | 1 | 0.01 |
| 10 | Coleoptera | | Eulichadidae | | Stenocolus | | 1 | 0.01 |
| 10 | Ephemeroptera | | Ephemerellidae | | Attenella | | 3 | 0.01 |
| 10 | Ephemeroptera | | Ephemerellidae | | | | 31 | 0.21 |
| 10 | Ephemeroptera | | Leptophlebiidae | | | | 5 | 0.07 |
| 10 | Plecoptera | | Perlidae | | | | 6 | 0.14 |
| 10 | Plecoptera | | Leuctridae | | | | 1 | 0.01 |
| 10 | Tricoptera | | Polycentropodidae | | Cyrenellus | | 3 | 0.07 |
| 10 | Tricoptera | | Polycentropodidae | | Neureclipsis | | 23 | 0.17 |
| 10 | Tricoptera | | Leuctridae | | Perlomyia | | 4 | 0.04 |
| 10 | Tricoptera | | Polycentropodidae | | Cyrennclus | | 11 | 0.11 |


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