# WALTZ CREEK

## NORTHAMPTON COUNTY

## WATER QUALITY STANDARDS REVIEW

## AQUATIC LIFE USE ATTAINABILITY EVALUATION

**Segment: Basin**
**Stream Code: 63243**
**Drainage List C**

**WATER QUALITY MONITORING AND ASSESSMENT SECTION** (TES)
**DIVISION OF WATER QUALITY ASSESSMENT AND STANDARDS**
**BUREAU OF WATER SUPPLY AND WASTEWATER MANAGEMENT**
**DEPARTMENT OF ENVIRONMENTAL PROTECTION**

**JANUARY 2001**

**REVISED MAY 2004**

## INTRODUCTION

In 1994, it was determined that during the compilation of Chapter 93, the Waltz Creek basin was not assigned a "designated use". The designated uses listed for the surrounding Martin's Creek drainage segments are either Cold Water Fishes (CWF) or Trout Stocking (TSF) and Migratory Fishes (MF, in part) but they do not include Waltz Creek.

Northeast Regional Office staff conducted a survey on December 20, 1994 and recommended that the Chapter 93 designated use for the Waltz Creek basin be Cold Water Fishes (CWF) because of the presence of well established cold water fauna and Migratory Fishes (MF) because of the presence of the American eel (DEP 1995). However, there was no information offered to consider warmer summer month conditions. Subsequent assessments were conducted in 1997 and 1998. In addition, there was the opportunity to consider newer, more detailed Waltz Creek fishery data collected by the Pennsylvania Fish & Boat Commission (August 1999). The purpose of this report is to review the information and data gathered during these investigations in order to determine the proper Chapter 93 designated use for Waltz Creek.

## GENERAL WATERSHED DESCRIPTION

Waltz Creek is a tributary to Martins Creek in the Delaware River drainage. The basin is located in Plainfield and Washington Townships and the Borough of Pen Argyl in Northampton County north of Easton (Figure 1). Waltz Creek is a freestone stream (with some alkaline influences) that drains 11.1 $mi^2$ and flows in a southeastly direction. Relatively flat rural lands with some gently rolling hills of low relief characterize the surrounding area.

There are significant impacts to the Waltz Creek basin from human activities. Land uses include localized agricultural activities, rural residential development, and the urban areas of Pen Argyl. In addition, Waltz Creek is located in the "slate belt" of northeast Pennsylvania. Thus, the study area is also noted for active and historic slate quarries. It appears that portions of upper Waltz Creek had been relocated in the past to accommodate quarrying activities.

## WATER QUALITY AND USES

### Surface Water

No long-term water quality data were available to allow a direct comparison to water quality criteria. However, chemical "grab" samples and biological data have been collected from Waltz Creek during recent field surveys conducted by the Department's Northeast Regional Office (NERO) staff and the Pennsylvania Fish & Boat Commission (PFBC).

**Department Surveys.** These surveys include a 12/20/94 survey (DEP 1995), 9/10/97 assessments made under the Unassessed Waters (UW) Program, and a 2/11/98 "intensive follow-up" survey (DEP 1998).

The intensive follow-up survey was conducted in response to the UW stream assessment observations. The Department's UW Program assesses the state's surface waters using qualitative biological data to identify impaired waters, sources and causes of these impairments, and to attribute their origin to either "point" or "nonpoint" sources. Another mechanism provided by the UW program, is a more detailed intensive follow-up survey in order to confirm and better define the nature, extent, sources, causes, and discharge origins of the observed impairments.

**PFBC IBI Fish Survey.** The PFBC (1999) collected fish at one site on Waltz Creek on 8/25/99. This effort was an intensive "one-pass removal" method for the purpose of collecting fish population data that will be used in developing a fish-based Index of Biotic Integrity (IBI) for small Pennsylvania streams.

Figure 1 shows station locations of these various survey sample points.

**Water Quality.** Laboratory analysis results of Waltz Creek surface waters are presented in Table 1. Grab samples indicated that the overall water quality of Waltz Creek is generally good. However, the

instantaneous nature of grab samples precludes comparison to applicable water quality criteria. Despite the limitations of grab samples, observations can be made that provide a generalized overview of Waltz Creek's water quality. The grab sample results were generally better than criteria. Based on hardness, alkalinity, calcium, and magnesium concentrations, grab sample analysis results suggest that Waltz Creek generally exhibits normal buffering capacity. While most metals analyzed were below detection limits and Chapter 93 criteria values, concentrations for copper at 1WC and 2UNT and zinc at 1WC and 3UNT slightly exceeded their hardness-based criteria. These parameter concentrations were also elevated at other stations but higher hardness levels attenuated their impacts. Except for nutrients, other tested parameters exhibited normal background concentrations. Nutrients were elevated below the Pen Argyl sewage treatment plant at 3UNT and in the lower Waltz Creek mainstem (4WC). Water chemistry information and field observations indicate that Waltz Creek displays fluctuations in water quality often associated with runoff from storm sewers and residential areas (DEP 1998).

There are two active NPDES permitted point source discharges in the study area. One is a municipal sewage treatment plant discharge located on an unnamed tributary of Waltz Creek (Figure 1; Table 1) in the Borough of Pen Argyl permitted to the Pen Argyl Municipal Authority. The second discharge is a non-municipal sewage treatment discharge located in Plainfield Township and permitted to H.A. Berkheimer, Inc.

There is one permitted surface water withdrawal permit in the study area – an instream diversion for the Citizens Utility Water Company for 0.149 MGD.

**Aquatic Biota**

The indigenous aquatic community is an excellent indicator of long-term conditions and is used as a measure of both water quality and ecological significance. NERO staff collected habitat and benthic macroinvertebrate data during their 1994 & 1998 surveys. Fish data were collected by NERO in 1994 and by the PFBC in 1999.

**Habitat.** For simplicity, the most current habitat data (DEP 1998) is reported in Table 2. Instream habitat conditions were evaluated at each station where benthic macroinvertebrates were sampled. The habitat evaluation consists of rating twelve habitat parameters to derive a station habitat score. The range of habitat score totals for Waltz Creek stations was 156-211 – generally considered to reflect sub-optimal to optimal habitat conditions.

**Benthos.** NERO's benthic macroinvertebrate collection efforts employed the Department's PA-DEP RBPIII benthic sampling methodology. The PA-DEP RBPIII method is a modification of EPA's Rapid Bioassessment Protocols (RBPs; Plafkin, et al 1989). The collected and processed benthic samples serve as the basis for benthic metric analysis and allows comparisons of Waltz Creek metrics scores to generally accepted water quality predictive scoring ranges (e.g. Shannon diversity index range of <1-3+, where low scores are indicative of poor quality and higher scores better quality).

Waltz Creek supports widely varied benthic macroinvertebrate populations. Macroinvertebrates collected in the Waltz Creek basin (Table 3) revealed taxa richness (total # of taxa) values ranging 7-31 in December 1994 and 4-19 in February 1998. Modified EPT index scores were also widely variable with ranges of 2-12 (1994) and 0-19 (1998). It must be noted that both surveys were conducted during winter conditions, so there should not be very much variablility attributed to seasonality. However, the older survey data from 1994 reflects total sample identifications while only portions of the 1998 collections were identified (100+ sub-samples). This difference in sample processing accounts for the variation between the two NERO surveys.

Despite the different sample sizes between the two NERO surveys, pollution sensitive benthic metric values were comparable. The benthic collections of both surveys were consistent with each other and reflect the water quality conditions of their respective station. The macroinvertebrate communities were quite varied in condition, "health", and diversity, and contained a number of pollution-tolerant genera. For example, when considering the 1998 data, Waltz Creek's upper stations (1- & 4WC) and headwater tributaries (2- & 3UNT) scored poorly. The "Shannon" diversity index, a traditional benthic metric where low scores indicate poor conditions, scored low – ranging from .47 to 1.59. (Normally, in the spectrum of typical diversity index scores, <1 represent "very poor" water quality conditions and 3+ represent "excellent" conditions). The HBI scores (Hilsenhoff Biotic Index; high values indicating poorer water quality conditions) for 2- & 3UNT were among the highest found in the study area (6.25 & 5.88, respectively). With the exception of the lower-most station (8WC), the other stations scored poorly w ith the %Dominant Taxon m etric (Higher percentages indicating benthic community imbalance). The poor performances of these three metrics indicate that the stream has been subjected to varying degrees of chronic or acute degradation. These stations receive the

discharge from the Pen Argyl STP and runoff from residential areas.

The best benthic conditions found in Waltz Creek appear at 8WC and at the headwaters of Greenwalk Creek (5GC). Relative to the rest of the study area, these stations had the best scores for taxa richness (19, 17), HBI (3.85, 3.46), and Shannon diversity (2.45, 1.91). Conditions at Station 8WC may reflect improved water quality as a result of dilution of runoff emanating from Pen Argyl in the headwaters of Waltz Creek. Greenwalk Creek headwaters (5GC) don't receive direct urban runoff like Waltz Creek does.

**Fish.** Waltz Creek fish populations were sampled by NERO staff in 1994 and with the assistance of PFBC biologists in August 1999. The presence of coldwater fishes, particularly brown trout, was the basis for the Department's original use-attainability recommendations (1995). The PFBC's IBI survey provided valuable warm weather data concerning the Waltz Creek fishery.

Seven species of fish were captured in Waltz Creek during the Department's December 1994 survey (Table 4). The PFBC quantitative IBI survey documented the same species plus one – the shield darter (*Percina peltata*). Forty-six brown trout (85-288mm in size) and 3 rainbow trout (155-323) were captured during the PFBC survey. These species were also collected in 1994. Brown and rainbow trout are cold water species and the rest, while commonly found in cold water streams, are more widely adaptive and temperature tolerant "coolwater fishes". The size of captured trout (sub-legal sizes of <175mm) suggest natural reproduction. However, Greenwalk Creek supports a trout hatchery, which raises the possibility of sub-legal sized "escapees" (especially the observed rainbows). Overall, the Waltz Creek fishery is dominated by blacknose dace with low-to-moderate density brown trout populations being present.

## PUBLIC RESPONSE AND PARTICIPATION SUMMARY

The Department provided public notice of this redesignation evaluation and requested any technical data from the general public through publication in the Pennsylvania Bulletin on April 22, 2000 (30 Pa.B 2071). A similar notice was also published in The Express Times newspaper (Easton, PA) on April 21, 2000. In addition, Plainfield and Washington Townships, Pen Argyl Borough, and Lehigh Valley Planning Commission were notified of the redesignation evaluation in a letter dated April 19, 2000. No data on water chemistry, in-stream habitat, or the aquatic community were received in response to these notices.

A draft of this report was submitted to the above stakeholders, along with a request for comments, on September 20,2002. No comments were received in response to this request.

The Department's initial recommendation as a result of this evaluation was to designate the entire Waltz Creek basin Cold Water Fishes, Migratory Fishes (CWF, MF). This recommendation was approved by the Environmental Quality Board and published as proposed rulemaking (33 Pa.B 4165). During the public comment period, the PFBC advised the Department that its assessment work at two sites on Waltz Creek in August 2002 developed data to support the inclusion of Waltz Creek on the Class A Wild Trout Streams list. The Commission published notice in the *Pennsylvania Bulletin* on March 20, 2004 (34 Pa.B 1643) that it proposed to add portions of Waltz Creek to its list of Class A Wild Trout Streams. Formal action to designate a portion of Waltz Creek as a Class A Wild Trout stream was taken at the Commission meeting on April 19 - 20, 2004, following the public comment period. The Department obtained the PFBC inventory report for the lower reach of Waltz Creek and its independent review confirmed that the Class A wild brown trout criterion for a High Quality Cold Water Fishes water is met. As a result, the portion of Waltz Creek downstream from the confluence of Greenwalk Creek is now recommended for designation as High Quality-Cold Water Fishes, Migratory Fishes (HQ-CWF, MF).

## RECOMMENDATIONS

The biological data indicate that Waltz Creek supports cold water and migratory fish. Two species of trout were collected from Waltz Creek during both cold and warm months. American eels were also collected in the mainstem. These species were found in both 1995 and 1999. In addition, PFBC data indicate the presence of a Class A brown trout population in the lower reaches of Waltz Creek.

Based on applicable regulatory criteria and the PFBC fishery data obtained during the public comment period

on the proposed rulemaking, the Department recommends the following use designations for the Waltz Creek basin:

Waltz Creek - Basin, Source to confluence of Greenwalk Creek: Cold Water Fishes, Migratory Fishes (CWF, MF), based on the presence of a reproducing brown trout population

Greenwalk Creek - Basin: Cold Water Fishes, Migratory Fishes (CWF, MF), based on the presence of reproducing trout populations

Waltz Creek, Basin - Greenwalk Creek to mouth: High Quality-Cold Water Fishes (HQ-CWF), based on the presence of a Class A wild brown trout population documented by PFBC and formally designated as such

This recommendation adds approximately 14.6 stream miles of CWF waters to Chapter 93.

## REFERENCES

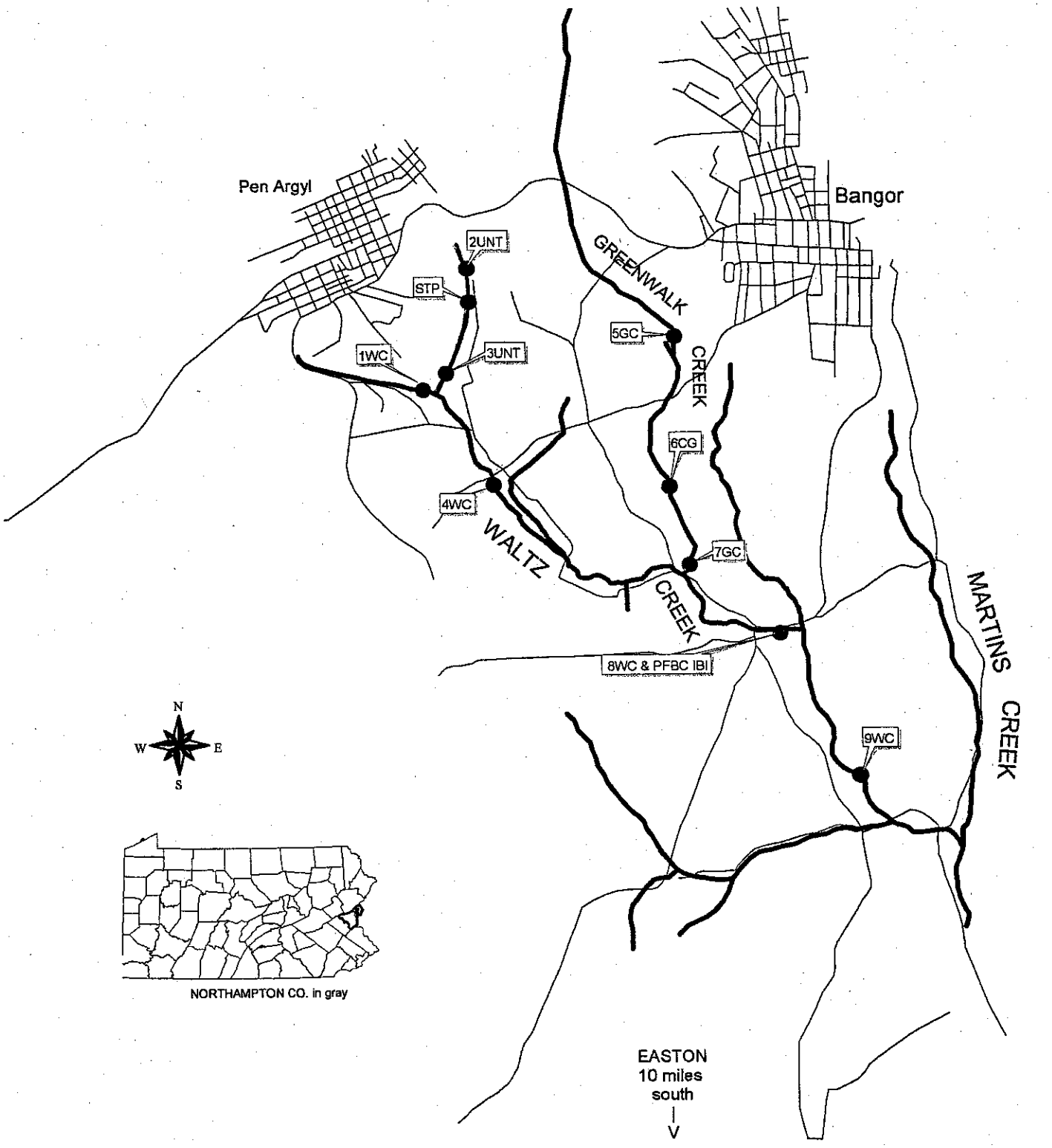

Plafkin, JL, MT Barbour, KD Porter, SK Gross, & RM Hughes. 1989. Rapid Bioassessment Protocols for use in streams and rivers: Benthic Macroinvertebrates and Fish. United States Environmental Protection Agency. EPA/444/4-89-001.

Department of Environmental Protection. 1995. *Use-Attainability Investigation; Waltz Creek, Northampton County.* Northeast Regional Office Memorandum; March 24, 1995 (on 12/20/94 survey).

Department of Environmental Protection. 1998. *Waltz Creek Intensive Follow-up Survey.* Northeast Regional Office Report; June 28, 1998 (on 2/11/98 survey).

Pennsylvania Fish & Boat Commission (1999). File information, 8/25/99 IBI Survey of Martins Creek basin.

# FIGURE 1. WALTZ CREEK WATERSHED NORTHAMPTON CO.



# TABLE 1
## WATER CHEMISTRY [1]
## WALTZ CREEK, NORTHAMPTON COUNTY
## FEBRUARY & APRIL 1998

| STATIONS [2] | 1WC (1) | | 2UNT (4E) | | STP | | 3UNT (5E) | | 4WC (2) | | 5GC (6G) | | 6GC (7G) | | 8WC (3) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATES [3] | 2/11/98 | 4/13/98 | 2/11/98 | 4/13/98 | 2/11/98 | 4/13/98 | 2/11/98 | 4/13/98 | 2/11/98 | 4/13/98 | 2/11/98 | 4/13/98 | 2/11/98 | 4/13/98 | 2/11/98 | 4/13/98 |
| pH | 6.7 | 6.8 | 6.4 | 6.5 | 7.3 | 7 | 7.0 | 6.9 | 7.1 | 6.8 | 6.3 | 6.4 | 6.5 | 6.6 | 7.1 | 6.8 |
| ALK | 34 | 32 | 32 | 26 | 162 | 50 | 74 | 42 | 56 | 40 | 15.2 | 15.4 | 19.2 | 20 | 36 | 32 |
| COND | 300 | 312 | 158 | 118 | 1030 | 660 | 642 | 465 | 553 | 479 | 216 | 201 | 210 | 217 | 371 | 343 |
| BOD | 1.4 | 0.83 | <0.3 | 0.86 | 4.4 | 14.5 | 1.2 | 4.3 | 0.8 | 2.2 | <0.3 | 1 | 3.2 | 0.8 | 0.5 | 1.3 |
| SuspSol | 10 | 32 | 14 | 32 | 24 | 44 | 8 | 48 | 24 | 58 | <2 | 6 | 14 | 26 | 2 | 40 |
| $NH_3$ | <0.02 | <0.02 | <0.02 | <.02 | 0.28 | 1.54 | 0.03 | 0.14 | <0.02 | 0.09 | <0.02 | <.02 | 0.08 | 0.05 | <0.02 | <.02 |
| $NO_2$ | <0.01 | <0.01 | <0.01 | <.01 | 0.7 | 0.34 | 0.1 | 0.08 | 0.04 | 0.05 | <0.01 | <.01 | 0.01 | <.01 | 0.02 | <.01 |
| $NO_3$ | 1.18 | 1.12 | 1.00 | 0.63 | 25.82 | 13.5 | 7.63 | 3.77 | 5.07 | 2.99 | 1.00 | 0.82 | 0.89 | 0.77 | 3.37 | 2.35 |
| TOT P | <0.02 | <0.02 | <0.02 | 0.02 | 2.06 | 1.81 | 0.35 | 0.29 | 0.17 | 0.14 | <0.02 | <.02 | 0.06 | 0.04 | 0.08 | 0.07 |
| HARD | 25 | 91 | 44 | 36 | 21 | 69 | 46 | 134 | 189 | 159 | 61 | 50 | 61 | 55 | 119 | 101 |
| CA | 34.6 | 31.5 | 18.7 | 12.3 | 20.5 | 22.6 | 55.8 | 42.6 | 78.0 | 51.8 | 19.6 | 18.9 | 19.6 | 19.3 | 35.4 | 36.7 |
| MG | 8.63 | 12.2 | 3.63 | 2.57 | 19.10 | 14.1 | 22.60 | 17.3 | 109.00 | 19 | 7.68 | 6.77 | 7.09 | 7.01 | 11.70 | 13.6 |
| CU* | - | <10 | <10 | <10 | 21 | 24 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| PB* | <1 | <1 | <1 | <1 | 1.1 | 2.8 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 |
| NI* | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <10 | <50 | <50 | <50 | <50 | <50 |
| ZN* | 18 | <10 | 10 | <10 | 69 | 62 | 30 | 16 | 133 | <10 | 49 | <10 | 105 | <10 | 83 | <10 |
| MBAS | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - | <0.5 | - |
| AL* | - | <200 | - | <200 | - | 397 | - | <200 | - | <200 | - | <200 | - | <200 | - | 200 |
| MN* | - | <10 | - | <10 | - | 73 | - | 19 | 29 | 18 | - | <10 | - | 12 | - | 19 |
| FE* | - | 135 | - | 41 | - | 466 | - | 201 | - | 225 | - | 21 | - | 136 | - | 271 |
| CR* | <50 | <50 | - | <50 | - | <50 | - | <50 | - | <50 | - | <50 | - | <50 | - | <50 |
| B* | - | - | <250 | - | 710 | - | <250 | - | - | - | - | - | - | - | - | - |
| HG* | - | - | <1 | - | <1 | - | <1 | - | - | - | - | - | - | - | - | - |
| F COL/100ml | 160 | 60 | 170 | <20 | <20 | 20 | 3100 | 40 | 880 | 100 | <20 | 20 | 160 | <20 | 60 | 60 |
| F STP/100ml | <20 | 20 | <20 | <20 | 3100 | 3600 | 1100 | 280 | 280 | 120 | <20 | <20 | <20 | <20 | 60 | 40 |

1- Except for pH & conductance and indicated otherwise, all values are in mg/l

* - concentrations in µg/l

2 - NERO survey stations in parentheses

3 - collected as part of the 1998 intensive follow-up survey

# TABLE 2
# HABITAT ASSESSMENT SUMMARY
# WALTZ CREEK, NORTHAMPTON COUNTY
# FEBRUARY 1998

| HABITAT PARAMETER | scoring range | STATIONS [1] | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1WC 1 | 2UNT 4E | 3UNT 5E | 4WC 2 | 5GC 6G | 6GC 7G | 8WC 3 |
| 1 . instream cover | 0 - 20 | 13 | 9 | 12 | 14 | 15 | 17 | 16 |
| 2 . epifaunal substrate | 0 - 20 | 16 | 13 | 13 | 17 | 16 | 16 | 17 |
| 3 . embeddedness | 0 - 20 | 10 | 16 | 11 | 10 | 18 | 15 | 17 |
| 4 . velocity/depth | 0 - 20 | 16 | 15 | 16 | 16 | 11 | 17 | 16 |
| 5 . channel alterations | 0 - 20 | 13 | 7 | 16 | 15 | 19 | 16 | 15 |
| 6 . sediment deposition | 0 - 20 | 9 | 12 | 11 | 12 | 18 | 17 | 17 |
| 7 . riffle frequency | 0 - 20 | 17 | 16 | 17 | 17 | 19 | 18 | 18 |
| 8 . channel flow status | 0 - 20 | 17 | 16 | 17 | 17 | 19 | 18 | 17 |
| 9 . bank condition | 0 - 20 | 6 | 16 | 15 | 10 | 19 | 18 | 17 |
| 10 . bank vegetation protection | 0 - 20 | 16 | 16 | 16 | 13 | 19 | 16 | 14 |
| 11 . grazing/disruptive pressures | 0 - 20 | 16 | 13 | 16 | 10 | 19 | 16 | 13 |
| 12 . riparian vagetation zone width | 0 - 20 | 12 | 5 | 13 | 5 | 19 | 10 | 5 |
| Total Score | 0 - 240 | 161 | 154 | 173 | 156 | 211 | 194 | 182 |

# TABLE 3
## WALTZ CREEK, NORTHAMPTON COUNTY
## D-FRAME RESULTS
## December 1994 & February 1998

| STATIONS | 1WC | 2UNT | | 3UNT | 4WC | | 5GC | 6GC | 7GC | 8WC | 9WC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NERO Stations | ST 1 | epk-UNT | ST 4E | ST 5E | epk-2 | ST 2 | ST 6G | ST 7G | epk-Gwalk | ST 3 | epk-3 |
| Survey dates | Feb-98 | Dec-94 | Feb-98 | Feb-98 | Dec-94 | Feb-98 | Feb-98 | Feb-98 | Dec-94 | Feb-98 | Dec-94 |
| **TAXA** | | | | | | | | | | | |
| Mayflies | | | | | | | | | | | |
| Ameletidae ***Ameletus*** | - | - | - | - | - | - | 1 | - | - | - | - |
| Baetidae ***Baetis*** | 7 | - | | 1 | 1 | 8 | - | 7 | 4 | 4 | 8 |
| Ephemerellidae ***Ephemerella*** | - | - | - | - | 1 | - | - | - | 7 | 12 | 53 |
| ***Eurylophella*** | - | - | - | - | - | - | 2 | - | - | - | 1 |
| ***Serratella*** | - | - | - | - | - | - | 10 | 11 | 3 | 6 | |
| Heptageniidae ***Stenonema*** | - | - | - | - | - | - | - | - | 2 | 3 | 15 |
| Stoneflies | | | | | | | | | | | |
| Perlidae ***Acroneuria*** | - | - | - | - | - | - | - | - | - | 2 | 7 |
| ***Paragnetina*** spp | - | - | - | - | - | - | - | - | - | - | 6 |
| ***Phasganophora*** * | - | - | - | - | - | - | - | - | - | - | 5 |
| Capnidae ***Paracapnia*** | - | - | - | - | - | - | 19 | - | - | - | - |
| Chloroperlidae ***Sweltsa*** | - | - | - | - | - | - | 3 | - | - | - | - |
| Pelodidae ***Yugus*** | - | - | - | - | - | - | 1 | - | - | - | - |
| Peltoperlidae ***Tallaperla*** | - | - | - | - | - | - | - | - | - | - | - |
| Caddisflies | | | | | | | | | | | |
| Glossosomatidae ***Glossosoma*** | - | - | - | - | - | - | - | - | - | - | 1 |
| Goeridae ***Goera*** | - | - | - | - | - | - | - | - | - | - | 1 |
| Hydropsychidae ***Cheumatopsyche*** | - | - | - | 14 | 85 | 6 | 1 | - | 275 | - | 65 |
| ***Diplectrona*** | - | 3 | - | 1 | 3 | - | - | - | - | - | - |
| ***Hydropsyche*** | - | - | 1 | 3 | 30 | 6 | 1 | 1 | 30 | 9 | 22 |
| Hydroptilidae ***Palaeagapetus*** | - | - | - | - | - | - | 1 | - | - | - | - |
| Limnephilidae ***Hydatophylax*** | - | - | - | - | - | - | - | - | - | - | 10 |
| Philopotamidae ***Chimarra*** | - | - | - | - | - | - | 1 | 33 | 130 | 5 | 57 |
| ***Dolophilodes*** | - | - | - | - | - | - | - | - | 1 | 1 | 21 |
| Polycentropodidae ***Polycentropus*** | - | - | - | - | - | - | 1 | - | - | 1 | 5 |
| ***Potamyia*** | - | - | - | 1 | - | - | - | - | - | - | - |
| Rhyacophilidae ***Rhyacophila*** | 1 | - | - | - | - | - | 1 | | 3 | 1 | 18 |
| Uneoidae ***Neophylax*** | | 14 | 3 | - | - | - | - | - | - | - | - |
| True Flies | | | | | | | | | | | |
| Chironomidae | 5 | 35 | 59 | 101 | 119 | 15 | 12 | 60 | 60 | 9 | 30 |
| Empididae ***Clinocera*** | - | - | 1 | 1 | - | - | - | - | - | 1 | - |
| Muscidae ***Limnophora*** | - | - | 1 | - | 1 | 1 | - | - | - | - | - |
| Simulidae ***Prosimulium*** | - | - | - | - | - | - | - | - | 1 | - | - |
| ***Simulium*** | - | - | - | 10 | 13 | 3 | | 2 | 1 | 1 | - |
| Tipulidae ***Antocha*** | - | - | - | - | - | - | - | - | - | - | 4 |
| ***Dicranota?*** | - | - | - | - | - | - | - | - | - | - | 1 |
| ***Pedicia*** | - | - | - | - | 1 | - | - | - | - | - | - |
| ***Tipula*** | - | 24 | 2 | 3 | 8 | - | - | - | 2 | - | 2 |
| Tabanidae | - | - | - | - | 2 | - | - | - | - | - | 2 |
| Misc. Insect Taxa | | | | | | | | | | | |
| Dyticscidae | - | 1 | - | - | - | - | - | - | - | - | - |
| Elmidae ***Optioservus*** | - | - | - | - | 3 | 7 | 1 | 1 | 10 | 20 | 22 |
| ***Promoresia*** | - | - | - | - | 1 | - | - | - | - | - | 1 |
| ***Stenelmis*** | - | - | - | - | - | - | - | - | - | 4 | 4 |
| Psphenidae ***Psephenus*** | - | - | - | - | 1 | - | - | - | - | 1 | 17 |
| ***Ectopria*** | - | - | - | - | 1 | - | - | - | - | - | 1 |
| Sialidae ***Sialis*** | - | - | - | - | - | - | - | - | - | 1 | - |
| Gomphidae sp | - | - | - | - | - | - | - | - | 1 | - | 1 |
| ***Arigomphus*** | - | - | - | - | - | - | 1 | - | - | - | - |
| ***Boyeria*** | - | - | - | - | - | - | - | - | - | - | 1 |
| Non-Insect Taxa | | | | | | | | | | | |
| Amphipoda ***Gammarus*** | 97 | 1 | - | - | 177 | 48 | 41 | - | 148 | 4 | 29 |
| Isopoda ***Caecidotea*** | - | - | 2 | - | 4 | - | - | 39 | 318 | | 6 |
| Mollusca ***Physa*** | - | - | 5 | - | - | - | - | - | - | - | - |
| ***Sphaerium*** | - | - | - | - | - | - | - | - | 4 | - | - |
| Oligochaeta | - | 9 | 6 | - | 11 | 1 | 3 | - | - | 1 | 7 |
| Turbellaria ***Cura*** | - | - | - | - | - | - | - | 3 | - | - | - |
| **total # individals** | 110 | 87 | 80 | 135 | 462 | 95 | 100 | 157 | 1000 | 86 | 423 |
| **taxa richness** | 4 | 7 | 9 | 9 | 18 | 9 | 17 | 9 | 18 | 19 | 31 |
| **mEPT** | 1 | 2 | 1 | 1 | 2 | 0 | 9 | 2 | 6 | 7 | 12 |
| **Hilsenhoff** | 4.191 | 5.138 | 6.25 | 5.881 | 5.152 | 4.82 | 3.46 | 5.338 | 5.318 | 3.849 | 3.754 |
| **% Dom** | 88.18 | 40.23 | 73.75 | 74.81 | 38.31 | 50.53 | 41 | 38.22 | 31.8 | 23.26 | 15.37 |
| **%mMayfly** | 0 | 0 | 0 | 0 | 0.2 | 0 | 13 | 7 | 1.2 | 24.49 | 16.3 |
| **Shannon** | 0.469 | 1.469 | 1.064 | 0.959 | 1.689 | 1.591 | 1.91 | 1.562 | 1.754 | 2.485 | 2.806 |

* = *Agnetina*

# TABLE 4
## FISHES [1]
## WALTZ CREEK, NORTHAMPTON COUNTY

| | station | Waltz | | | | |
|---|---|---|---|---|---|---|
| | | 1WC | 4WC | 7GC | 8WC | 9WC |
| | data source [2] | DEP:epk-1 | DEP:epk-2 | DEP:epk-Gwalk | PFBC | DEP:epk-3 |
| *Salmo trutta* , **brown trout** | | A | A | A | 46 (85-288mm) | C |
| *Oncorhynchus mykiss* , **rainbow trout** | | - | - | R (<150mm) | 3 (155, 180, 323mm) | R (<150mm) |
| *Rhinichythys atratulus* , **blacknose dace** | | - | C | - | 176 | P |
| *Rhinichythys cataractae* , **longnose dace** | | - | - | - | 51 | R |
| *Catastomus commersoni* , **white sucker** | | R | C | - | 26 | P |
| *Etheostoma olmstedi* , **tessellated darter** | | - | - | - | 5 | R |
| *Percina peltata* , **shield darter** | | - | - | - | 8 | - |
| *Anguilla rostrata* , **American eel** | | - | - | - | 36 | P |
| | TOTAL TAXA | 2 | 3 | 2 | 8 | 7 |

1 - X = ocurrence; R - rare, P - present, C - common, A - abundant; counts for significant game fish indicated
2 - DEP: epk# =12/20/94; PFBC: 8/25/99
3 - juvenile/adult