NJ Department of Environmental Protection
Water Monitoring and Standards

AMBIENT BIOMONITORING NETWORK

Northwest Water Region
Upper Delaware and Wallkill River Drainages
Watershed Management Areas 1, 2, and 11
Round 3 Benthic Macroinvertebrate Data
Volume 1 of 2

February 2008

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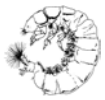

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Watershed Management Areas 1, 2, and 11

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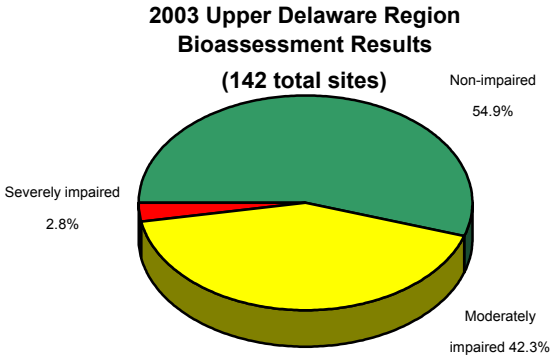
EXECUTIVE SUMMARY

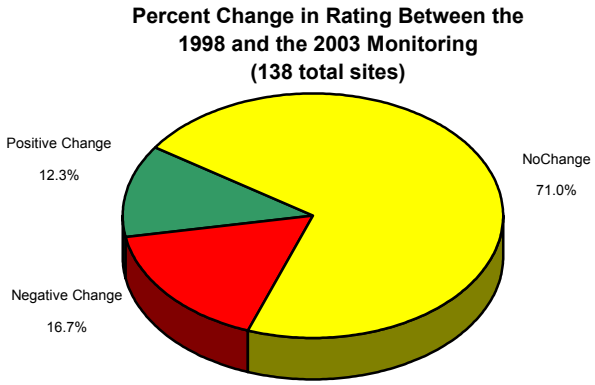
Biological monitoring of freshwater systems in New Jersey provides an effective means of gauging long-term trends in surface water quality throughout the State. The Ambient Biomonitoring Network (AMNET) is one of the major ongoing monitoring programs. This statewide network of over 800 AMNET stations employs sampling and taxonomic analysis of in-stream macroinvertebrate communities to assess the ecological condition at each station. Following sample analysis, an integrated index of "biometrics", based on community composition and pollution tolerance levels of individual taxa, assigns one of three "impairment" levels to each site (ie. non-impaired, moderately impaired, or severely impaired). The results are considered reflective of the water or habitat quality at each site. This information is used by the Department, primarily in assessing progress toward the goals of the Clean Water Act via the Integrated 305 (b)/303 (d) Water Quality Monitoring and Assessment Report. AMNET data are also very useful for designation of Category 1 waters, based on exceptional ecological significance. Results are reported separately for each of New Jersey's five major drainage basins or "Water Regions" (Lower Delaware, Upper Delaware/Northwest, Northeast, Raritan and Atlantic), each encompassing several sub-basins ("Watershed Management Areas"). The Water Regions, with an average of 165 AMNET sites each, are sampled in consecutive years on a five-year rotational basis.

This report presents the results for the biological monitoring conducted in the Upper Delaware/Northwest Water Region from April 2002 to June 2003. The sampling of this Region marks the start of the third round of data collection for the AMNET program. For the Upper Delaware/Northwest Water Region the results obtained in the current round are similar to those of the previous (second round) sampling. Overall, there are considerably more non-impaired sites in the Upper Delaware/Northwest Region than in the other four New Jersey Water Regions, based on data to date. Currently, of 142 AMNET sites in the Upper Delaware/Northwest Water Region, 78 (54.9%) were found non-impaired, 60 (42.3%) moderately impaired, and 4 (2.8%) severely impaired. The Upper Delaware/Northwest Region primarily includes all New Jersey sub-basins draining to the non-tidal Delaware River, extending northward from Trenton Falls; it also includes the Wallkill River sub-basin. The region falls primarily within the Kittatinny Ridge and Valley, Reading Prong and Piedmont ecoregions, encompassing largely upland forest with high-gradient terrain. The proportion of non-impaired sites is greatest (62.8%) in the northernmost Delaware River sub-basins (which comprise WMA #1); the proportion of impaired sites is greater (54.7%) in the central Delaware and Wallkill River sub-basins (WMA's # 11 and 2 combined). The latter areas feature somewhat lower relief, with agriculture and greater urbanization (e.g. the city of Trenton and suburbs) especially in the southernmost portion.

Results from the current (2002/03) sampling are compared to those from the same sites sampled in the earlier rounds (1992/1993, 1998). Of the 142 total AMNET sites presently in the Upper Delaware/Northwest Water Region, intermediate (1998) and current samplings yielded substantially fewer severely impaired sites in round 2 and round 3 (0.7%, 2.8% respectively) than did the first (1992/93) sampling (16.8%); however, the later rounds, 2 and 3, yielded more moderately impaired sites (41.3, 42.3% respectively) than did the first round (37.4%). The number of non-impaired sites has slightly increased in round 2 and round 3 (58.0, 54.9% respectively) compared to the first round (45.8%). This may be due, in part, to the change we made to our index period by now sampling only during the most productive time period (between April and November). In addition, the second round of sampling for the Upper Delaware/Northwest Region was performed during a drought period and this may have affected some of the benthic flora recovered.



As reflected in the present study results, human land uses and practices, superimposed on the undisturbed physical terrain, play a major role in controlling the degree of pollution or degradation in a stream system. The relationship between benthic macroinvertebrate community impairment has been statistically related to different physiographic land types, land uses and other anthropogenic factors, on a statewide basis. These findings strongly indicate that human land uses and practices play a major role in the degree of pollution or degradation in a stream system.



To determine what factors are contributing to impairments, or changes in impairment ratings, the Department has established a Stressor Identification (SI) process. The purpose of the Stressor Identification (SI) process as developed by USEPA is to identify the principle stressor(s), including but not limited to specific pollutants, responsible for the degraded biological condition. Identifying whether the principal stressor(s) is a *pollutant* or, if a specific pollutant(s) cannot be identified, is due to generic *pollution* is the first step towards deciding whether a pollutant(s) specific TMDL or other appropriate management measures will be taken to remediate the impairment.

INTRODUCTION

Rationale for Biological Monitoring

Biological monitoring, as referenced in this report, pertains to the collection and analysis of stream macroinvertebrate communities as indicators of water or habitat quality. Macroinvertebrates are larger-than-microscopic, primarily benthic (bottom-dwelling) fauna, which are generally ubiquitous in freshwater and estuarine environments, and play an integral role in the aquatic food web. Insects (largely immature

forms) are especially characteristic of freshwaters; other major groups include worms, mollusks (snails, clams) and crustaceans (scuds, shrimp, crayfish, etc.). They are more readily collected and quantified than either fish or periphyton communities. Species comprising the in-stream community occupy various niches, based on functional adaptation or feeding mode (e.g. predators, filter or detritus feeders, scavengers); their presence and relative abundance is governed by environmental conditions (which may determine available food supply), and by pollution tolerance levels of the respective taxa. The overall community thus is holistically reflective of conditions in its environment. Assessments of ambient water / habitat quality can then be made based upon standardized procedures, which can show perturbations measured as changes or differences in community structure [1]. While development of a "multitrophic" approach, to include finfish and periphyton communities with invertebrates is being investigated, the primary means of assessment to date has been through macroinvertebrate community analysis.

Advantages of Using Benthic Macroinvertebrates:

1. They are good indicators of localized conditions of water quality due to their limited mobility. As such, they are well suited for the assessment of site-specific pollution impacts.
2. They are sensitive to environmental impacts from both point and non-point sources of pollution.
3. They integrate the effects of short-term environmental variations, such as oil spills and intermittent discharges.
4. Sampling is relatively easy and inexpensive.
5. They are holistic indicators of overall water quality, even for substances that may be present, but at lower than detectable levels.
6. They are normally abundant in New Jersey waters as well as aquatic environments in general.
7. They serve as the primary food source for many species of commercially and recreationally important fishes.
8. Unlike chemical monitoring, where impacts to the environment tend to be by inference, not direct determination, they provide a direct measure of water quality in a manner consistent with the goals of the Clean Water Act.
9. They can be used to assess nonchemical impacts to the aquatic habitat, such as by thermal pollution, excessive sediment loading (siltation), or eutrophication.
10. To the general public, impacts to resident benthic macroinvertebrate communities are more tangible measurements of water quality than more esoteric listings of chemical test results.
11. When monitored together with relevant chemical/physical parameters, benthic macroinvertebrate communities can be used to identify sources of impairment.

Limitations of Biological Monitoring:

Biological monitoring cannot replace chemical monitoring, toxicity testing, and other standard environmental measurements. Each of these tools provides the analyst with specific information available only through its respective methodology.

The following illustrations provide an overview of the major macroinvertebrate indicator groups employed in making biological water quality assessments.

Benthic Macroinvertebrates Usually Indicative of Good Water Quality

Mayfly nymphs are often abundant wherever the water is clean. They are sensitive to various types of water pollution, including low dissolved oxygen, ammonia, biocides, and metals.

Stonefly nymphs are usually found only in cool, well-oxygenated waters free of pollution. Though not usually found in the numbers characteristic of mayflies, the presence of even a few stoneflies is indicative of good water quality.

Most caddisfly larvae, many of which build portable cases of stones, sticks, sand, and other detritus, are intolerant of water pollution.

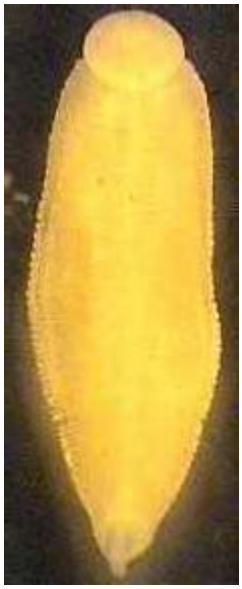
Aquatic beetles are common in well-oxygenated, swiftly running waters; many species are referred to as "riffle beetles." They are usually indicative of clean water since they are sensitive to wetting agents (soaps and detergents) and other pollutants.

All photographs taken by D.Bryson, NJDEP

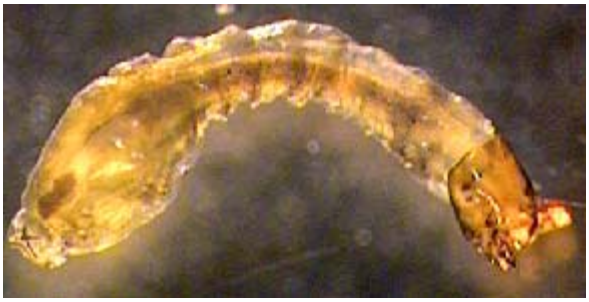
Benthic Macroinvertebrates Usually Indicative of Poor Water Quality

Midges (chironomids) are among the most common of aquatic invertebrates. They occupy a variety of aquatic habitats, including lakes, ponds, bogs, rivers, creeks, and marshes. They even exploit manmade habitats such as sewage treatment plants, water treatment plants, fish pools, irrigation ditches, and birdbaths. Many species are very tolerant of pollution.

Aquatic sowbugs, or freshwater isopods, are abundant in waters enriched with organic nutrients and low in dissolved oxygen. They are commonly observed in the recovery areas below sewage treatment plants.



Leeches and other segmented worms are very common in our lakes and streams, though not often noticed. They are tolerant of poor water quality and severe pollution.



Black fly larvae are filter feeders, capturing and ingesting plankton and bacteria from the surrounding water with specialized antennae. Some species are very tolerant of poor water quality and thus can be used as indicators of pollution.

All photographs taken by D.Bryson, NJDEP

STUDY DESIGN

DATA QUALITY OBJECTIVES

The major goal of AMNET is to provide a long-term, cost-efficient means of gauging the quality of surface waters and watershed areas throughout the State. This is accomplished through biological sampling and analysis from a network of stream sites that adequately represents New Jersey's five major drainage basins and NJDEP's Watershed Management Areas (WMA). Administratively, a total of twenty-one WMAs have been delineated within New Jersey's five basins. Each major basin constitutes a "Water Region"; a major sub-basin forms each WMA. Within each WMA are several smaller sub-basins, delineated by the United States Geological Survey (USGS) as "hydrologic units," scale 11 (HUC11). The study area of the present report (see Figure 1) includes WMA #'s 1 (Upper Delaware tributaries), 2 (Wallkill River and tributaries), and 11(Central Delaware tributaries) (also see Maps 1 – 8, Volume 2). The standard sampling interval of five years, reflects a realistic temporal lag between cessation of an environmental perturbation and recovery of the impacted biological community. The Integrated 305(b)/303(d) Water Quality Monitoring and Assessment Report [2], which re-examines changes in New Jersey's stream systems on a two-year cycle, has indicated that five years is an optimum period for long-term biomonitoring. An ample network of stations is required for the creation of a long-term database, which in turn, is necessary for trend analysis and operation of water quality predictive models.

Figure 1

Map of 2003 study area

The AMNET program is designed to monitor a complete Water Region's complement of stations within a year's time, giving modelers and planners a snapshot of ambient biological impacts during that particular year. Sampling is curtailed through the coldest months (December to March), because of difficulties encountered in obtaining representative samples during this period.

SITE SELECTION

Sites were selected essentially to provide representative coverage of each Water Region, as well as the entire State. To ensure enough flow for sampling, sites on "first-order" streams [3] are situated at least three miles downstream of headwaters (first order streams are the smallest permanent streams). Since most streams at this level have very little (or only intermittent) flow, most of our sites are situated on second-order streams (with only first-order streams as tributaries) and higher (with a greater hierarchy of tributaries). All sites are located in reasonably accessible and primarily wadable segments, proceeding downstream to the head-of-tide. Sites are numbered in approximate upstream to downstream order, from the mainstem of each major sub-basin to each adjacent tributary, and then to the next adjacent sub-basin. This is in an approximate north to south order within the Upper Delaware/Northwest Water Region. The mainstem Delaware River is not included, since this is under the jurisdiction of the Delaware River Basin Commission (DRBC).

To maximize data correlation, the Ambient Surface Water Chemical Monitoring Network, which is

administered jointly by NJDEP and the USGS [4], wherever possible, incorporates existing AMNET stations. Furthermore, so as to gauge the effects of major tributaries and larger lakes, many AMNET sites are located near their confluence or outlet. On larger streams, more than one site was selected along the stream reach. Sites were selected near the headwaters and upstream of any confluence. This was done in an attempt to bracket known sources of contamination (e.g. point-source discharges, agricultural operations) and significant natural features such as wetlands, parks or wildlife management areas. Bracketing these features may aid in determining the cause of changing impairments along the stream reach.

Exact AMNET site locations were determined via the Global Positioning System (GPS) using Trimble Pathfinder units and the appropriate correction sources utilized by NJDEP. All positions were logged into the DEP's Geographical Information System (GIS) (see Maps 1 – 8, Volume 2).

A total of 142 sites were established for the previous round of AMNET sampling in the Upper Delaware/Northwest Water Region (1997-1998) [5]. This area (shown in Figure 1) primarily includes all New Jersey sub-basins draining to the nontidal Delaware River (WMA's #1 and 11) from Assunpink Creek (Mercer County) northward to Clove Brook near the New Jersey/New York border (Sussex County), plus the upper Wallkill River sub-basin (WMA #2). The lower Assunpink Creek is the only tidally affected stream segment in this region. Previously, in the first AMNET round, a portion of the lower Delaware River drainage, containing 87 AMNET sites, had been included in the upper Delaware study area [5]. With the establishment of Water Regions by the NJDEP, the Upper and Lower Delaware Regions were divided by the "head-of-tide" at Trenton Falls (see Map 7, Volume 2); the upper tidal sub-basins formerly included with the upper Delaware, from Cooper River (Camden County) to Crosswicks Creek nearer Trenton, became part of the lower Delaware Water Region [6]. Also, the upper Wallkill River sub-basin, with 17 AMNET sites, was added to the Upper Delaware/Northwest Water Region; this sub-basin, which drains northeastward to the Hudson River in New York, was formerly included with the greater Passaic or Northeast basin [5]. The present Upper Delaware/Northwest study area (Figure 1) includes a total of 142 sampling sites, AN0001 – 118 and AN0294 - 309A (see Table 2, Volume 2). Site AN0013 (Stony Brook) in the current data set was relocated for better access. No samples had been collected from this site during the first two rounds of sampling.

FIELD & LABORATORY METHODS

Benthic macroinvertebrate sampling and analysis is performed in accordance with the NJDEP Field Procedures Manual [7], Rapid Bioassessment Protocol (RBP) guidelines of the USEPA [8] and Standard Operating Procedures (SOP) of the NJDEP Aquatic Biomonitoring Laboratory [9]. As detailed in the SOP, and in the quality assurance work plan [10], a thorough quality control program, with emphasis on macroinvertebrate taxonomy, is practiced.

Sample Collection

In general, a "multi-habitat" approach is used, focussing on the more productive habitat types [8]. The usual sampling device is a D-frame kick net, of 800 x 900 um mesh size and one foot width (a Surber sampler or Ponar dredge may be employed when conditions require). In high-gradient streams, where the predominant substrate is cobble, the riffle/run area is the preferred sampling habitat; other likely habitat types however, are sampled when present. The kick net is held firmly against the hard bottom, and an area approximately one foot upstream of the net is disturbed using feet and/or hands. This procedure is

repeated, sampling all velocity/depth regimes at the site, including at least one riffle-run-riffle sequence (if present). In the low-gradient Coastal Plain streams, bottoms generally consist of sand or mud without dominant cobble/riffle areas; therefore, a variety of stable substrates including woody debris, submerged macrophytes and portions of banks, are sampled. The "jab and sweep" method [11] is employed; a minimum of 20 jabs/sweeps are taken, proportioned approximately to the numbers of each habitat type present. In all cases, stream distance sampled approaches, but does not exceed, 100M. Level of effort is consistent for all sites. In the presence of road crossings, where possible, sampling is done upstream of bridges, sufficiently removed to avoid influence of any associated channel alterations. If poor accessibility or safety concerns inhibit sample collection upstream of a bridge, then sampling is performed downstream. Again, every effort is made to avoid sampling within the influence of channel alteration associated with a bridge. However, such alterations may be extensive and unavoidable. These conditions will be reflected in the field observations and habitat assessments. The entire sample is sieved using a #30 mesh sieve bucket, put into wide-mouthed (1-L) jars, and preserved with 5 to 10% formalin (to 20% in cases of excessive organic loading). Both the sieve bucket and net are examined for adhering organisms. Any found are removed with forceps and placed into the sample jar. During the field operations, qualitative observations of riparian habitat, surrounding land use, potential pollution sources, and presence of other aquatic biota are recorded (Appendix D, Volume 2); a visual-based qualitative physical habitat assessment [8] is also performed (see p. 10). These observations/evaluations, however do not factor into the final bioassessment rating.

Sample Processing and Sorting

In the laboratory, after rinsing in a #30 mesh sieve to remove the preservative, the composited sample is evenly distributed in a light-colored pan marked with numbered grids of equal size. The numbered grids are then randomized using a computerized random number generator. Using low-power magnification (6.3x), all organisms greater than 2mm in size are then removed from a successive randomly selected grids until a total of at least 100 organisms is obtained. Colonial groups (e.g. Bryozoa and Porifera), vertebrates, and terrestrial organisms are not included in the subsample. Organisms retained are reasonably intact to allow for accurate identification.

Macroinvertebrate Identification and Quality Control

The individuals from the subsample are identified to the lowest practicable taxonomic level, usually genus or species, using 7 to 30X stereozoom and 40 to 400X compound magnification. The Biomonitoring Unit currently uses Leica Model MZ6 stereomicroscopes and Leica Models DMLS and DME compound microscopes. A computerized digital camera system projects and records microscope images of selected specimens to aid in their identification. A comprehensive collection of taxonomic keys and other references, including functional (or niche) descriptions and pollution tolerance classifications for most species, is maintained in the laboratory. An indexed list of these is given in the Laboratory SOP [9]. Pertinent new reference material is added when available. Taxonomists confer with each other regarding species in question. The International Taxonomic Information System (ITIS) (www.itis.usda.gov) is monitored for possible changes in nomenclature or groupings. Consultation with other scientists in the field, particularly from agencies involved in similar programs (e.g. New York Department of Environmental Conservation, USGS, USEPA), provides added assistance and confirmation, when needed. For verification, 10% of the samples are sent to a qualified independent consultant for parallel identifications. For the 2002-03 Northwest Water Region, these samples were sent to EcoAnalysts Inc., Moscow, Idaho. The calculated mean percent taxonomic disagreement [12] was 11.75% for genus-level identifications, which is within the 15% acceptable limit for taxonomic precision. A macroinvertebrate specimen reference collection is maintained in the laboratory.

Data Analysis

Biological impairment may be caused by several major factors such as organic enrichment, habitat degradation, or toxicological effects. It may be manifested in several aspects of the benthic macroinvertebrate community; these include absence of pollution-sensitive taxa, especially the EPT group, i.e. Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies); excessive dominance of pollution-tolerant taxa such as Chironomidae (midges) and Oligochaeta (worms); low overall taxa numbers, or other perceptible differences in community structure relative to a reference condition.

Data analysis within the RBP protocol, makes use of biological community metrics and the pollution indicator concept. "Biometrics" measure different components of community structure, including population and functional parameters, each with a different range of sensitivity to pollution stresses [1, 13]. The use of a variety of biometrics assures a more robust or valid assessment; therefore, an anomaly in any one metric is less likely to invalidate the study findings. The results are integrated through common scoring criteria, derived from an established comparable database, to determine a final numerical rating and consequent biological condition category (see Table 1). This provides the analyst with an easily communicated evaluation of relative impairment, referred to in this report as the "bioassessment rating." For RBP protocols, results are based on 100 organism sub-samples of the field sample. Scoring criteria for RBP protocols [1] are calibrated for family level taxonomy, giving three final rating categories (non-impaired, moderately impaired, and severely impaired).

The biometrics employed, and subsequent integrated index, were developed for New Jersey waters as outlined in the RBP methods [1]. The final numerical rating is referred to as the "New Jersey Impairment Score" (NJIS) and was statistically validated based upon data from 200 New Jersey stream sites [14]. The scoring criteria and rating categories are presented in Table 1. The metrics from which the NJIS is derived are explained below:

1. **Total Taxa or Taxa Richness** (# families) — an index of community diversity; the number usually increases with increasing water or habitat quality.

2. **Percent Contribution of the Dominant Family** (to the total # families) — dominance by relatively few species/families would indicate environmental stress.

3. **# EPT Families** — the number of families represented within the orders Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies), which are generally pollution-sensitive.

4. **Percent EPT** (of the total # individuals) — would increase with increasing water quality.

5. **Hilsenhoff (Family) Biotic Index** — tolerance values of 0 - 10 are assigned to individual families (zero = most intolerant); these values are used in the formula for calculating the Biotic Index which summarizes the overall pollution tolerance of the entire benthic macroinvertebrate community with a single value.

Trend Analysis
In evaluating the current AMNET data against that for the previous round, a significant improvement or decline is considered to have occurred if the difference in NJIS scores has changed the bioassessment rating. A complete list of site-by-site comparisons is presented in Table 2, where a (+) indicates a significant improvement, a (–) indicates a significant decline, and a (/) indicates no change in rating; a slash may have a (+) or a (-) indicating that the score improved or declined, but the bioassessment rating did not.

SUPPLEMENTAL ANALYSES / EVALUATION METHODS

Morphological Abnormalities
Occasionally, morphological abnormalities have been found in individual macroinvertebrates recovered in our AMNET collections. These deformities have been most readily detected in the Chironomidae (midges), where they occur primarily in the head appendages (antennae) and mouth parts (mentum and mandibles). While the incidence has been most frequent in the chironomids (especially those species categorized as detritivores, herbivores or periphyton feeders), abnormalities have also been observed in individuals of other taxonomic groups. Although this is not a factor in the NJIS data analysis, such features are noted, as they may signify possible contaminants or stressful conditions in the respective drainages. Abnormalities observed in the course of identification are noted; these results are summarized by sample site in Table 3, Volume 2. For Chironomidae, the data are displayed as (# of chironomids with abnormalities / # of chironomids examined). For all other taxa, just the number of individuals with abnormalities is presented. Photographic examples of abnormalities in midge larvae and amphipods (scuds), are presented in Appendix B, Volume 2.

Habitat Assessment
The physical attributes of habitat play an integral role in the health of the macroinvertebrate community. Where stations are physically comparable, detected impacts can be attributed to water quality factors. However, physical habitat degradation alone can account for biological impairment in a stream [1]. Parameters evaluated includes in-stream substrate, channel morphology, bank structural features, and riparian vegetation. The area evaluated includes the sample site and its immediate surroundings, particularly upstream, usually within a 100 – 200 foot radius. The visual-based qualitative habitat assessment results in one of four condition categories: optimal, suboptimal, marginal or poor, as outlined in the recently revised USEPA criteria [8].

The habitat assessment used for this study is separated into two basic approaches; one designed for high gradient streams and one designed for low gradient streams [8]. Examples of assessment forms for each approach can be found in Appendix C, Volume 2. Streams in the northern regions of New Jersey are generally considered to be “high gradient” streams, having substrates of rock and cobble of various sizes, and with relatively swift flow. Those in the Coastal Plain regions of southern New Jersey are considered as “low gradient” streams, having slower flow and more homogeneous substrates, primarily of sand or gravel and finer sediments. Habitat assessments may be temporarily downgraded by adverse weather conditions, such as excessive rainfall or prolonged drought. It should also be noted that habitat assessments are performed independently of the macroinvertebrate community analysis; thus, they do not factor into the final impairment score, but are used primarily as supplementary information.

Sediment Toxicity Testing

To supplement the results of the benthic macroinvertebrate sampling, acute sediment toxicity tests were performed on three AMNET sites that exhibited "severely impaired" biological conditions in the earlier survey of the present Upper Delaware/Northwest Water Region [5]. Testing was conducted in 1999, between the second and third rounds of sampling for the Upper Delaware/Northwest Water Region. The methods conformed to standardized USEPA protocols as reflected in laboratory Standard Operating Procedures [9]. The amphipod, *Hyalella azteca*, was used as the test organism in the 10-day tests that measured effects on both survival and growth. Results from the test sites were compared to the responses observed in reference sediment from non-impaired AMNET sites that were similar in morphology or habitat features. The AMNET sites tested are in WMA 1 (Maps 5-8, Volume 2). The test sites and corresponding reference sites are as follows:

WMA	Test Site	Reference Site	Test site Map #	Ref site Map #
1	AN0016 UNT to Paulinskill	AN0028 Jacksonburg Creek	5	5
1	AN0036 UNT to Pequest River	AN0028 Jacksonburg Creek	5	5
11	AN0093 Plum Brook	AN0028 Jacksonburg Creek	5	5

For a discussion of Sediment Toxicity results, see page 21.

Fish IBI

In addition to the AMNET sampling performed on freshwater streams, BFBM also supplements the benthic monitoring by performing a fish Index of Biotic Integrity (IBI) analysis at or near many AMNET stations. An IBI is an index that measures the health of a stream based on multiple attributes of the resident fish assemblage. Each site sampled is scored based on its deviation from reference conditions (i.e. what would be found in an unimpacted stream) and classified as poor, fair, good or excellent.

Data provided by the IBI has become another component of the DEP's suite of environmental indicators. The data helps to measure water quality use attainment and the Department's success in attaining the Clean Water Act goals as elaborated in the Department's integrated 305(b) and 303(d) Integrated Assessment Report. IBI data will also be used to develop biological criteria, prioritize sites for further studies, provide biological impact assessments, and assess status and trends of the state's freshwater fish assemblages.

There were 23 IBI sites performed in the Upper Delaware/Northwest basin prior to this round of sampling. Of them, 4 were Excellent, 18 were Good and one displayed a Fair IBI Rating. For more info on the Fish IBI results and reports, visit our web site at: www.state.nj.us/dep/wms/bfbm.

Chemical Monitoring

The Bureau of Water Quality Standards and Assessment (BWQSA) is responsible for the development, adoption, and administration of New Jersey's Surface Quality Standards (SWQS) and Ground Water Quality Standards (GWQS) [15]. This includes the development of water quality criteria to protect aquatic life and human health, the assignment of stream classifications to reflect existing and designated uses, and the promulgation of antidegradation policies to protect and maintain the quality of surface and ground waters of the State. The SWQS are used by many DEP programs including: the New Jersey Pollutant Discharge Elimination System program, Site Remediation

program, Stream Encroachment and the Land Use Regulation Program.

The SWQS form the basis for monitoring the degree of impairment of surface water bodies and for calculating total maximum daily loads (TMDLs), which represent the assimilative capacity of surface water for a given parameter of concern. The development of TMDLs includes balancing the impacts from point sources, non-point sources and natural background conditions. TMDLs are developed on a watershed basis to aid watershed management planning efforts.

BWQSA is also responsible for conducting and coordinating water quality assessments of all waters of the State. These assessments are reported through the New Jersey Integrated Water Quality Monitoring and Assessment Report (Integrated Report). [2] Historically, the Department summarized statewide water quality in a biennial report entitled, "New Jersey's Water Quality Inventory Report" (also known as the "305(b) Report") and proposed a separate "303(d) list" or "List of Impaired Waters". The current USEPA format for these reports (instituted in 2002) integrates the reporting requirements of Sections 303(d) and 305(b) of the Federal Clean Water Act into one comprehensive, integrated water quality assessment report.

To prepare the Integrated Report, BWQSA compiles available monitoring data from various agencies and organizations that collect measurements from the State's streams. The physical/chemical data is compared to water quality criteria outlined in the SWQS. Values for each measured parameter are evaluated and used to determine whether the waterway is in "full attainment of aquatic life use" or in "non-attainment of aquatic life use" based upon the levels outlined in those standards.

In this report, AMNET results were compared to BWQSA's use attainment designations as assessed using physical / chemical specific criterion. A list of AMNET sites corresponding to stream segments designated by BWQSA between 2002 and 2004 as "non-attainment of aquatic life use" based upon physical/chemical criterion can be found in Table 5, Volume 2. Forty-two (42) sites were designated as "non-attainment of aquatic life use" for at lease one physical / chemical parameter; the most common exceedences of the Surface and Ground Water Quality Standards being Temperature and Total Phosphorus. 19 sites were designated as "non-attainment of aquatic life use" for two or more of the following physical / chemical parameters: Total Phosphorus, Total Dissolved Solids, Total Suspended Solids, pH, Dissolved Oxygen, and Temperature. All but 25 AMNET sites, where an exceedence occurred, received a Moderately or Severely Impaired biological assessment. The remaining 25 AMNET sites where an exceedence occurred received a Nonimpaired biological assessment (see Table 5, Volume 2). Special attention should be given to the nonimpaired sites that exceeded standards. Continued degradation of the water quality will likely downgrade the nonimpaired assessment in the future.

The Department will attempt to identify the potential sources of impairment using the Department's Stressor Identification (SI) process. The purpose of the Stressor Identification (SI) process is to identify the principle stressor(s), including but not limited to specific pollutants, responsible for the degraded biological condition. Identifying whether the principal stressor(s) is a *pollutant** or due to more generic landscape changes caused by human activities, is the first step towards deciding whether a pollutant(s) specific TMDL or other appropriate management measures will be taken to remediate the impairment.

* As defined in the N.J. Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.) and the Federal Water Pollution Control

Act, aka “Clean Water Act” (33 U.S.C. 1251-1376)

RESULTS AND DISCUSSION

Summary of Statewide AMNET Data

The current study marks the beginning of the third round of AMNET monitoring. Both second and third round results yielded considerably more non-impaired sites in the Upper Delaware (58.0 and 54.9%, respectively) than did the second round results for all other New Jersey Water regions (35.2 to 36.9% for the Northeast, Raritan and Atlantic Regions; 15.7% for the Lower Delaware Region) [16]. This is most likely due to the much higher percentage of forested and wetland areas in this region as compared to the other four regions. The table below presents the proportions of non-impaired, moderately and severely impaired AMNET sites for all New Jersey Water Regions in the second AMNET round, plus the third round for the Upper Delaware/Northwest Water Region.

Region	**Number of sites**			
Third round	Non-impaired	Moderately impaired	Severely impaired	Total sites
Upper Delaware	78 (54.9%)	60 (42.3%)	4 (2.8%)	142
Second round				
Upper Delaware	80 (58.0%)	57 (41.3%)	1 (0.7%)	139
Northeast	38 (36.9%)	59 (57.3%)	6 (5.8%)	103
Raritan	57 (35.2%)	90 (55.6%)	15 (9.2%)	162
Atlantic	75 (35.2%)	115 (54.0%)	23 (10.8%)	213
Lower Delaware	31 (15.7%)	139 (70.6%)	27 (13.7%)	197
First round				
Upper Delaware	87 (45.8%)	71 (37.4%)	32 (16.8%)	190
Northeast	36 (31.3%)	63 (54.8%)	16 (13.9%)	115
Raritan	54 (37.5%)	82 (56.9%)	8 (5.6%)	144
Atlantic	76 (38.6%)	100 (50.8%)	21 (10.6%)	197
Lower Delaware	17 (14.7%)	83 (71.5%)	16 (13.8%)	116

Results and Trends

Overall, the bioassessment ratings for each of the monitoring stations are best estimates of the in-stream biological impairment based upon the data obtained in the current AMNET survey. Detailed taxonomic and statistical data, bioassessment ratings, habitat assessment scores and observations for each AMNET site are given in Table 2 and Appendix D, Volume 2.

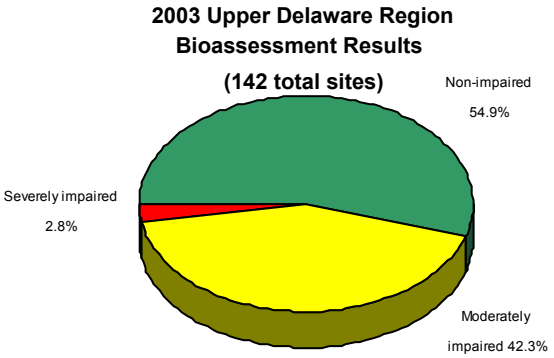


Figure 2

Figure 2 depicts the overall results for the current study in the Upper Delaware/Northwest Water Region. Of the 142 monitoring stations sampled during this study period, 78 or **54.9%** were rated as "**non-impaired"**, 60 or **42.3%** were rated as "**moderately impaired"**, and 4 or **2.8%** were rated as "**severely impaired"** (see Table 2, Volume 2).

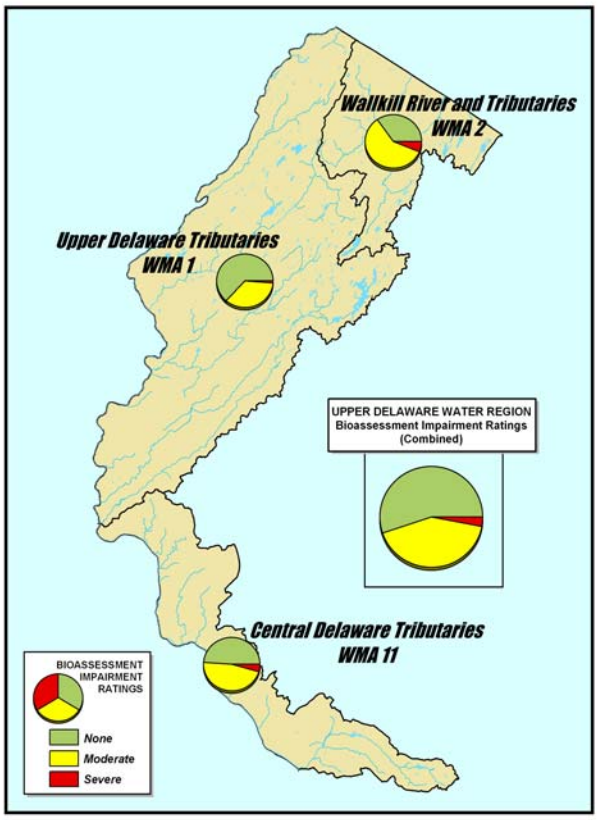


Figure 3. Map of the Upper Delaware Water Region showing relative stream impairment levels in each Watershed Management Area.

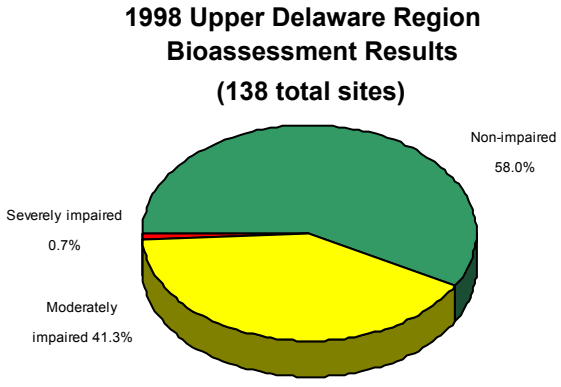


Figure 4

Figure 4 shows the results obtained from the same 138 AMNET sites within the Upper Delaware/Northwest Water Region that were sampled during the previous upper Delaware study (see "Site Selection" p.1, Table 2, Volume 2). While the results for 2002/03 were similar to those for 1997/98, for the current sampling period the number of non-impaired sites were slightly lower, but the numbers of moderately and severely impaired sites were slightly higher. The first sampling (1992/93) of the same 138 sites yielded more severely impaired sites (16.8%), and somewhat fewer moderately impaired (37.4%) and non-impaired sites (45.8%), than in the most recent two samplings [5].

Figure 5 displays the percentage of change in bioassessment rating among the 138 AMNET sites in the Upper Delaware/Northwest Water Region that were sampled during both the second (1997/98) study period [5], and during the current (2002/03) study period (see "Site Selection" p.6 & Table 2, Volume 2). The green indicates sites that have undergone a positive change, yellow indicates no change, and red indicates a negative change. Positive change includes both severe to moderate, and moderate to non-impairment; negative change includes both non-impairment to moderate and moderate to severe impairment. (see Table 2, Volume 2).

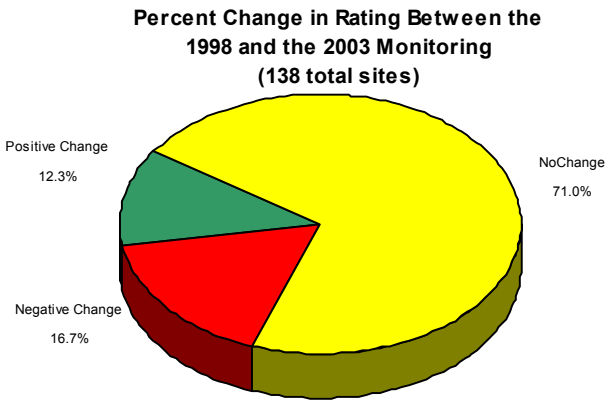


Figure 5

Regional Results

A USGS study, using data generated from NJDEP's AMNET program [17], statistically related levels of impairment to physiographic land types, corresponding land uses, and other anthropogenic factors on a statewide scale. A non-impaired community was most positively related to the area of forested and undeveloped land in its watershed upstream, and to the total underlying terrain in the steeper gradient ecoregions of northwestern New Jersey (ie. Reading Prong/Highlands). Conversely, a severely impaired community was most positively related to the area of urban land, and to the total volume of wastewater (point source) discharge [17]. The table below presents the proportion of non-impaired, moderately impaired and severely impaired AMNET sites, based on the current data, in each of the Upper Delaware/Northwest Watershed Management Areas.

WMA's	Sub-basins	Non-impaired	Moderately impaired	Severely impaired	Total sites
1	Upper Delaware River tributaries	49 (62.8%)	28 (35.9%)	1 (1.3%)	78
2	Upper Wallkill River system	6 (35.3%)	10 (58.8%)	1 (5.9%)	17
11	Central Delaware River tributaries	23 (48.9%)	22 (46.8%)	2 (4.3%)	47
	Totals:	78 (54.9%)	60 (42.3%)	4 (2.8%)	142

In the Upper Delaware/Northwest Water Region the majority of NJIS scores (54.9%) are high and fall within the "non-impaired" range; less than half are "moderately impaired" and only four sites are rated as "severely impaired" (see Table 2). Significantly, 49 of the 78 non-impaired sites (62.8%) are located in the northwestern sector within the Ridge and Valley and Reading Prong ecoregions, which constitutes WMA #1 (Upper Delaware tributaries). This area features primarily forested uplands with high-gradient terrain. The southern and northeastern sectors together contain more of the moderately and severely impaired sites (35 of 64, or 54.7%). The southern sector, extending from the lower Piedmont to the Inner Coastal Plain ecoregion, constitutes WMA # 11 (central Delaware River tributaries); the northeastern area, straddling the border between the Kittatinny Valley and upper Reading Prong ecoregions, comprises WMA # 2 (upper

Wallkill River drainages). Notably, these together contain fewer total AMNET sites than does WMA #1 (see Maps 1-8, Table 2, Volume 2); they feature somewhat lower relief with more agriculture and greater urbanization (e.g. city of Trenton), particularly in the southeastern portion.

Figure 3 illustrates the proportions of non-impaired, moderately and severely impaired sites in each WMA of the Upper Delaware/Northwest Water Region for the current AMNET round.

Evaluation by WMA

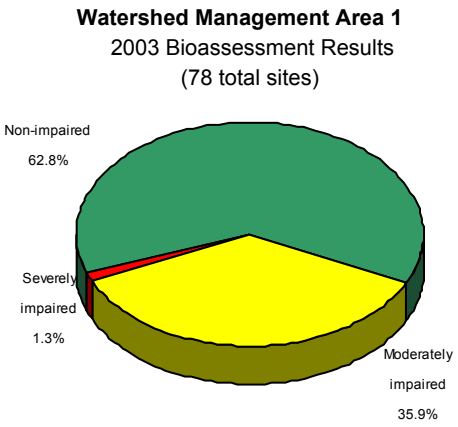


Figure 6

Watershed Management Area #1 includes a total of 78 AMNET sites in several sub-basins in Sussex and Warren Counties, with portions in Morris and Hunterdon Counties; these include Shimmers Brook, Flat Brook, Vancampens Brook, Papakating Creek, Delawanna Creek, Pohatcong Creek, Lopatcong Creek, Pequest River, Paulins Kill, Clove Brook, and Musconetcong River (see Maps 1-5, Volume 2). Figure 6 shows the current site rating summaries for WMA #1: 62.8% (49 sites) non-impaired, 35.9% (28 sites) moderately impaired and 1.3% (one site) severely impaired. Figure 7 depicts the results obtained from 74 of the same sites sampled during the earlier (1998) survey [5]. Comparing the current results to the earlier results, a significant improvement is seen at seven sites and a significant decline, at thirteen sites (see Table 2). The number of non-impaired sites is slightly lower than the earlier data, and the number of moderately impaired sites is slightly increased. The number of severely impaired sites is also slightly increased. The majority (60.3%) of habitat scores are in the optimal range, with 33.3% receiving a suboptimal and 6.4% receiving a marginal score. Abnormalities in chironomid larvae and other invertebrate families were found at two sites (one each on Mountain Lake Bk and Lopatcong Ck, Warren County) (see Table 3). The table below presents a synopsis AMNET data for WMA #1; AMNET site locations and bioassessment ratings within WMA # 1 are shown in Figure 8.

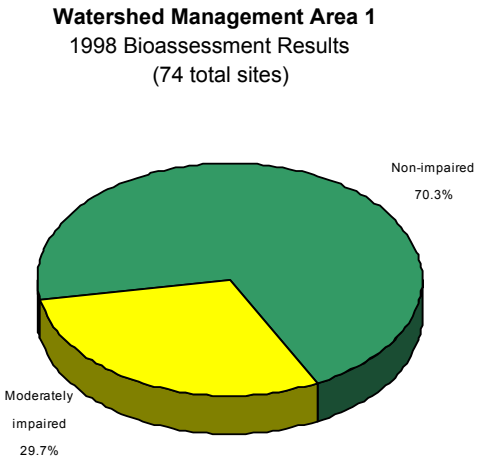


Figure 7

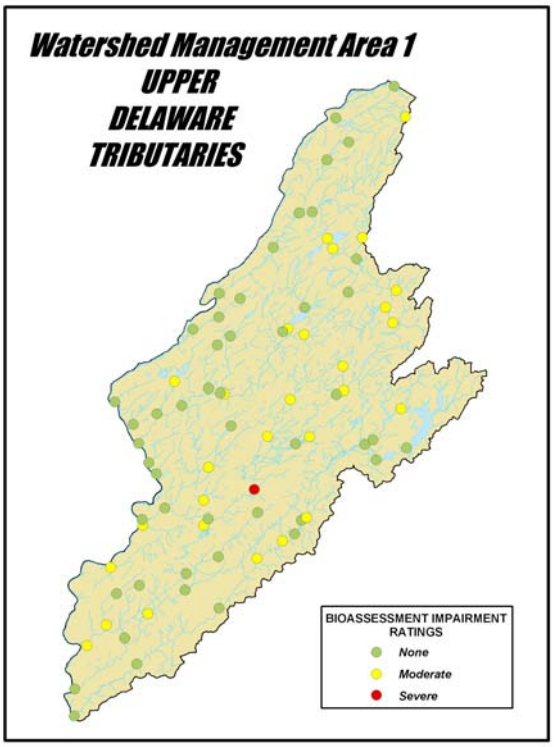


Figure 8

WMA # 1 Combined Results Table

NJIS Rating	1997/98		2002/2003			Habitat Assessment	2002/2003	
Non-Impaired	52	70.3%	49	62.8%		Optimal	47	60.3%
Moderate	22	29.7%	28	35.9%		Suboptimal	26	33.3%
Severe	---	------	1	1.3%		Marginal	5	6.4%
						Poor	---	------
Total sites	74		78				78	

Watershed Management Area #2 includes a total of 17 AMNET sites in the Wallkill River and its tributary Papakating and Pochuck Creek sub-basins, Sussex County (see Map 8, Volume 2). Figure 9 shows the current site rating summaries for WMA # 2: 35.3% (six sites) non-impaired, 58.8% (ten sites) moderately impaired and 5.9% (one site) severely impaired. These sites were initially sampled as part of the greater Passaic or Northeast basin AMNET survey, but were included in the Upper Delaware/Northwest Water Region prior to the second (1998) AMNET survey [5]. Figure 10 depicts the results obtained from 17 of the same sites sampled during the earlier (1998) survey. Comparing the current (2003) results to the earlier (1998) results, a significant improvement is apparent at four sites while two sites exhibited a decline in impairment rating (see Table 2, Volume 2). The percentage of moderately impaired sites shows a decrease, and the number of non-impaired and severely impaired sites shows a slight increase (Figures 8 & 9). The majority (47.0%) of habitat scores are in the optimal range with 41.2% receiving a suboptimal and 11.8% receiving a marginal score. Abnormalities in invertebrate families other than chironomid larvae were found at three sites (one each on Wawayanda Creek, Black Creek and Wallkill River, Sussex County) (see Table 3, Volume 2). The table below presents a synopsis of AMNET data for WMA #2; AMNET site locations and bioassessment ratings within WMA #2 are shown in Figure 11.

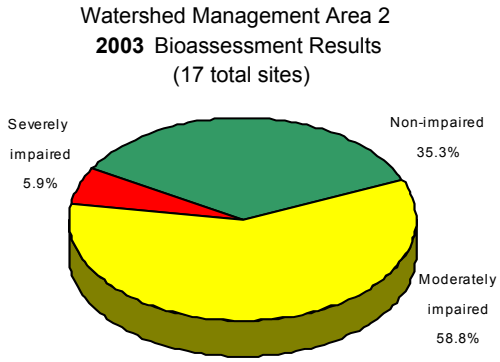


Figure 9

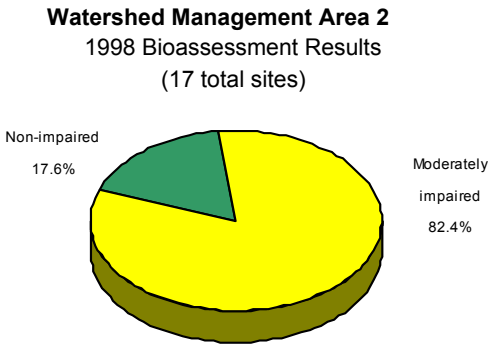


Figure 10

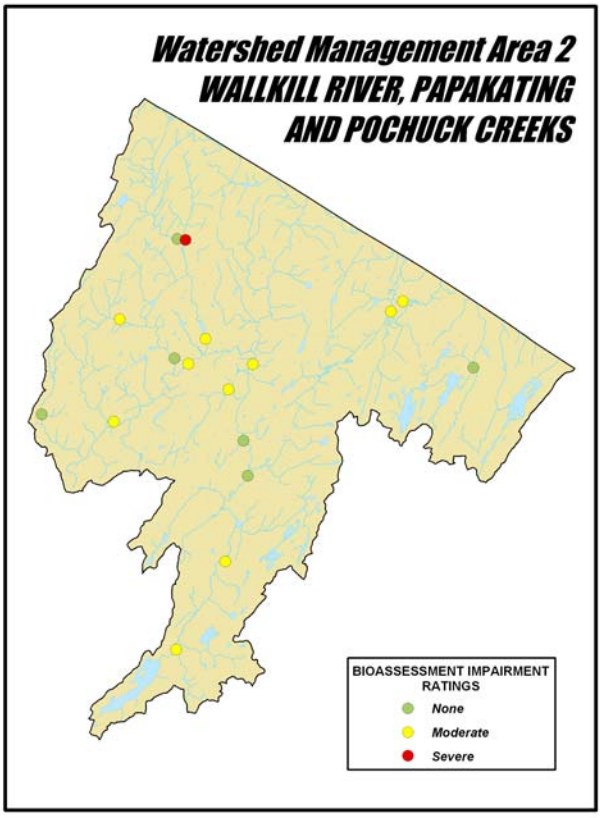


Figure 11

WMA # 2 Combined Results Table

NJIS Rating	1997/98		2002/2003			Habitat Assessment	2002/2003	
Non-Impaired	3	17.6%	6	35.3%		Optimal	8	47.0%
Moderate	14	82.4%	10	58.8%		Suboptimal	7	41.2%
Severe	---	------	1	5.9%		Marginal	2	11.8%
						Poor	---	------
Total sites	17		17				17	

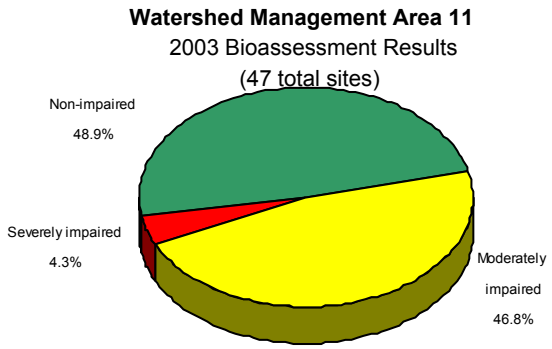


Figure 12

Watershed Management Area #11 includes a total of 47 AMNET sites in several smaller sub-basins from Hakihokake Creek, Hunterdon County to Gold Run, Mercer County, plus Assunpink Creek, Mercer/Monmouth Counties (see Maps 6 and 7, Volume 2). Figure 12 shows the current site rating summaries: 48.9% (23 sites) non-impaired, 46.8% (22 sites) moderately impaired and 4.3% (two sites) severely impaired. WMA # 11 was initially sampled as part of the first (1993) upper Delaware AMNET survey [17]. Figure 13 depicts the results obtained from 47 of the same sites sampled during the earlier survey. Comparing the current to the earlier results, a significant improvement is seen at six sites, and a significant decline, at eight sites (see Table 2, Volume 2). The number of moderately impaired and severely impaired sites increased slightly from that of the earlier sampling, and the number non-impaired of sites is slightly reduced (see Table 2, Volume 2). The majority of sites (46.8%) received either a sub-optimal or an optimal habitat score, with 6.4% receiving a marginal score. Abnormalities in chironomid larvae and other invertebrate families were found at thirteen sites in Mercer and Hunterdon Counties: one each on Wickecheoke Creek, Moores Creek, Jacobs Creek, Shipetaukin Creek, Little Shabakunk Creek, Shabakunk Creek, and Miry Run; two each on Lockatong Creek, Alexauken Creek, and Assunpink Creek (see Maps 6 & 7, Table 3, Volume 2). Eight of these sites displayed chronic abnormalities (see Table 3, Volume 2). The table below presents a synopsis of AMNET data for WMA #11; AMNET site locations and bioassessment ratings within WMA # 11 are shown in Figure 14.

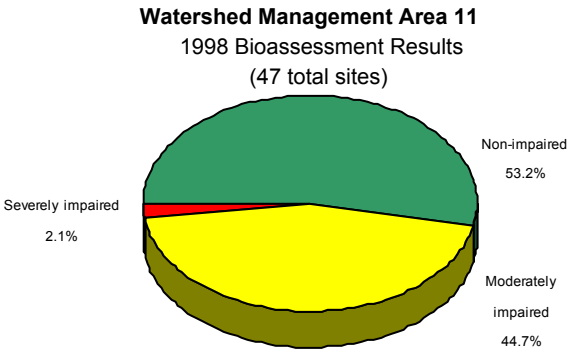


Figure 13

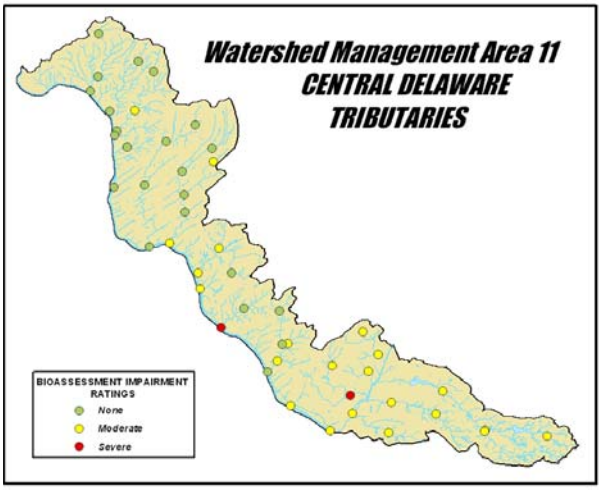


Figure 14

WMA # 11 Combined Results Table

NJIS Rating	1997/98		2002/2003			Habitat Assessment	2002/2003	
Non-Impaired	25	53.2%	23	48.9%		Optimal	22	46.8%
Moderate	21	44.7%	22	46.8%		Suboptimal	22	46.8%
Severe	1	2.1%	2	4.3%		Marginal	3	6.4%
						Poor	---	------
Total sites	47		47				47	

Macroinvertebrate Abnormalities

Occasionally, morphological abnormalities have been found in individual macroinvertebrates recovered in our AMNET collections. These deformities have been most often detected in larval organisms belonging to the insect family Chironomidae (midges), where they occur primarily in the head appendages (antennae) and mouthparts (mentum and mandibles). Abnormalities have also been observed in individuals of other taxonomic groups (such as Amphipoda), but they are most often noted in the mouthparts and antennae of Chironomidae because these features are key characteristics used in identification. Chironomidae larvae often comprise a large component of the benthic community of a stream or river, particularly in those affected by human disturbances, and they are part of the diet of predatory invertebrates and fish. As a result, chironomids are an important transfer vector linking the movement of contaminants from sediments to higher trophic levels [19].

Hamilton and Saether [20] noted deformed specimens (Chironomidae) occurred in areas of industrial or agricultural chemical input, but not in areas receiving only domestic effluents. Subsequent studies have supported this finding. But the presence of deformed organisms in a sample is difficult to interpret. Not all genera appear to react to the presence of contaminants in the same manner [21]. Most of the research has been focused on a few genera. The North Carolina Division of Environmental Management [22] has developed an index to evaluate deformities, using the frequency and severity of deformities observed in Chironomidae larvae of just the genus Chironomus. Morphological deformities undoubtedly occur in Chironomidae larvae living in uncontaminated environments. Even robust, healthy populations of any fauna are likely to include a certain proportion of physiologically weaker individuals which, for various reasons, may be more prone or genetically predisposed to malformation [21]. With a lack of baseline data of deformities in more pristine environments, the level at which these deformities becomes significant is somewhat uncertain. Currently, although not an indicator of specific contaminants, the occurrence of abnormal chironomid larvae can serve as an economical and long-term monitor of the benthic environment, and can suggest where more intensive bioassays and chemical testing would be most effectively employed [23].

Bearing in mind that the primary focus of the AMNET sampling is not to find morphological abnormalities, a listing of all AMNET sites in the Upper Delaware Water Region exhibiting these deformities is presented in Table 3. The data are displayed as # of chironomids with abnormalities / # of chironomids examined. For all other taxa, just the number of individuals with abnormalities is presented. The significance of these abnormalities has not been statistically evaluated. Deformities are called “chronic” if they were observed in more than one round of sampling at a given site. Also, the presence of abnormalities is not factored into the NJIS, but used to identify sites where additional investigations are needed.

Fewer abnormalities are seen in the current sampling than in the previous (1998) sampling [5]. From the current sampling of 142 sites, 18 (12.7%) contained organisms with abnormalities (Map 7, Volume 2). Eight of the sites exhibited a "chronic" presence of abnormalities (Table 3, Volume 2). Notably, these "chronic" sites are situated in WMA # 11, where a higher percentage of agriculture and urban land use occurs (Map 7, Volume 2). Further study is needed to establish the significance of the presence of abnormalities.

Sediment Toxicity Test Results

Three test sites were chosen to assess acute toxicity (as measured by mortality) was not demonstrated at any site during the sampling period. Based on statistical comparisons of the survival responses observed on the three sites, there was no significant difference from responses observed in the reference station [24]. Growth responses (average dry weights) at all sites were not significantly different from those of the control, thus indicating no chronic effects in this regard over the ten-day test period. For the sites that indicated no acute toxicity or no adverse growth response, the severe impairment levels observed are likely due to other causes, such as habitat alteration or various physiochemical factors. This also does not preclude the presence of toxic substances at low (but chronically toxic) levels undetectable by the present methodology, or the possibility that toxicants may have been introduced into the stream episodically rather than continuously. Supplemental monitoring at these is, therefore, suggested. Results are summarized in the table below.

				Results	
WMA	**Date**	**Test Site**	**Reference Site**	**Survival**	**Growth**
1	3/99	AN0016 UNT to Paulinskill	AN0028 Jacksonburg Creek	NMAT	NMAT
1	3/99	AN0036 UNT to Pequest R	AN0028 Jacksonburg Creek	NMAT	NMAT
11	3/99	AN0093 Plum Brook	AN0028 Jacksonburg Creek	NMAT	NMAT

NMAT = No Measurable Acute Toxicity
SigDiff = Significant Difference

Causes and Conditions of Impairment

Biological impairment, as determined through RBP analysis, is manifested by alterations or differences in macroinvertebrate community structure, compared to a reference or "ideal" condition. In an impaired situation, taxa of pollution-tolerant groups (such as worms and midges) tend to dominate over pollution-intolerant forms (e.g. mayflies, stoneflies, etc.), with an overall depression in species diversity. Such discrepancies are typically due to degraded instream environmental conditions, which may be caused by various human activities or land uses and, in some cases, by natural features or events. Environmental factors that may adversely affect stream biology, including both chemical and physical parameters, are listed below:

1. Degraded habitat (see Table 4, Volume 2)
    a. lack of stable and varied substrate
    b. lack of bank vegetation/canopy (= poor bank stability, lack of shade)
    c. excessive sedimentation (= poor substrate and water clarity)
    d. lack of streamflow (= low water level, low dissolved oxygen, possible sedimentation, undesirable vegetation)
2. Eutrophication (= excessive nutrients promoting undesirable vegetation or algal blooms, and increased turbidity)
3. Domestic (organic) waste (promotes hypoxia, turbidity, eutrophication)
4. Physiochemical water quality factors which, alone or in combination, can have adverse effects
    a. higher than normal temperature

b. excessive turbidity
c. lack of dissolved oxygen
d. presence of toxicants (in various chemical forms)

Inter-related human activities or practices, land uses, and natural features or events contributing to degraded stream quality:

1. Deforestation/development/construction (largely via runoff from non-point sources)
2. Urbanization/industrialization (largely via runoff from non-point sources)
3. Agricultural operations (largely via runoff from non-point sources)
4. Municipal or industrial wastewater discharge (from point source)
5. Artificial channelization or habitat alteration
6. Upstream impoundment, lake or pond
7. Drought conditions

Habitat Assessment vs. Biological Impairment

The relationship between habitat assessment scores and corresponding NJIS scores were plotted, and a coefficient of determination (R^2) value calculated for each WMA (Appendix C, Volume 2). The R^2 has a value ranging from zero to one, and is a fraction of the variance shared by two variables graphed along an X and Y axis. For example, if $R^2 = 0.59$, then 59% of the variance in X can be explained by the variance in Y, or vice versa. The higher the R^2 value, the more likely the variance in one variable can be explained by the variance of another. In this case the variables are habitat assessments vs. biological impairment (NJIS). The R^2 values were calculated to determine if general trends in habitat degradation could explain general trends in biological impairment. For all sites in the Upper Delaware/ Northwest Water Region, an overall R^2 value of 0.27 was calculated when comparing habitat assessments to NJIS. This can be interpreted that for all sites in this region, a strong direct correlation between habitat and biological impairment existed 27% of the time. An R^2 value was also calculated, individually, for the three WMAs in this Water Region. The R^2 values for WMA 1, 2, and 11, were 0.30, 0.21, and 0.24 respectively. Again, this indicates that a strong direct correlation between habitat and biological impairment existed 21% - 30% of the time.

The R^2 values suggest that other factors, which may include land use and/ or water quality, are likely contributing to the observed biological impairments. Sites with an impaired biological assessment, but with a relatively high habitat assessment score, could be impacted by point and/ or nonpoint sources of pollution either outside the range of the visual based habitat assessment or of a type not detectable by said habitat assessment. Also, an intermittent or short term impact may have occurred which left no obvious visual evidence at the site. In these cases, further investigation is needed to determine the source of impairment which is affecting the biota. Some sites assessed with a non-impaired biological assessment may have a relatively degraded habitat assessment. This could be due to a temporary degradation, such as drought or flooding (near to the time of the assessment), which was not severe enough to affect the biota. It is also possible that a temporary or recent degradation may not have immediate observable effects on the biota. In either case these sites should be studied further to avoid future impairment to the biota. Due to the prevalence of multiple stressors throughout the State, it is further suggested that the relationship between habitat assessments and biological assessments be studied on a site by site basis.
As reflected in the present study results, human land uses and practices, superimposed on the undisturbed physical terrain, play a major role in controlling the degree of pollution or degradation in a stream system

[17]. The relationship between benthic macroinvertebrate community impairment has been statistically related to different physiographic land types, land uses and other anthropogenic factors, on a statewide basis [17]. These findings strongly indicate that human land uses and practices play a major role in the degree of pollution or degradation in a stream system. Recent data analysis from Ayers et al., 2000 [25] for instance, concludes the following:

1) Fish and invertebrate communities are commonly impaired in urban streams;
2) Invertebrate community impairment was related to total urban land and total wastewater flow upstream of a site;
3) Changes in aquatic community structure were statistically related to environmental variables along the urban gradient – that is to say that such things as impervious surfaces were related to a negative response in the aquatic invertebrate community.

Conversely, the same Ayers data analysis also demonstrated that the area of forest and wetland in a stream's drainage basin was a strong mitigating factor in protecting invertebrate community health.

Additional Information

For more information, please contact:

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REFERENCES

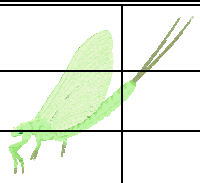
1. Plafkin, J.L., M.T. Barbour, K.D. Porter, S.K. Gross and R.M. Hughes, 1989. Rapid bioassessment protocols for use in streams and rivers—benthic macroinvertebrates and fish. EPA/44/4-89-002. US Environmental Protection Agency. Washington, D.C. 143pp. and appendices.
2. New Jersey Department of Environmental Protection. 2002. New Jersey 2004 integrated water quality monitoring and assessment report, 305 (b) and 303 (d). Water Monitoring and Standards. Trenton, NJ. 468pp
3. New Jersey Department of Environmental Protection. Data report, 1998. New Jersey's modernized ambient chemical monitoring network. Division of Watershed Management. Trenton, NJ. 12pp.
4. Strahler, A.N. 1964. Quantitative geomorphology of drainage basins and channel networks; section 4-2, *in Handbook of Applied Hydrology*, ed. Ven te Chow, McGraw-Hill, NY.
5. New Jersey Department of Environmental Protection. Data report, 1999. Ambient Biomonitoring Network, Upper Delaware Region. Bureau of Freshwater and Biological Monitoring. Trenton, NJ. 13pp. & maps and appendices.
6. New Jersey Department of Environmental Protection. Data report, 1999. Ambient Biomonitoring Network, Delaware Region, upper tidal portion. Bureau of Freshwater and Biological Monitoring. Trenton, NJ. 13pp. & maps and appendices.
7. New Jersey Department of Environmental Protection. 1992. Field sampling procedures manual. NJDEP. Trenton, NJ. 360pp.
8. Barbour, M.T., J. Gerritson, B.D. Snyder and J.B. Stribling. 1999. Rapid bioassessment protocols for use in wadable streams and rivers: Periphyton, Benthic Macroinvertebrates, and Fish, 2nd ed. USEPA 841-B-99-002. Chps. 1–11 and appendices.
9. New Jersey Department of Environmental Protection.. Laboratory report, 1998. Standard operating procedures for the aquatic biomonitoring laboratory. Bureau of Freshwater & Biological Monitoring. Trenton, NJ.
10. New Jersey Department of Environmental Protection. Report, 2002. Work/quality assurance project plan: Ambient Biomonitoring Network (AMNET), Upper Delaware Region, FY02-03. Bureau of Freshwater and Biological Monitoring. Trenton, NJ.
11. U.S. Environmental Protection Agency. 1997. Field and laboratory methods for macroinvertebrate and habitat assessment of low gradient nontidal streams. Mid-Atlantic Coastal Streams Workgroup, Environmental Services Division, Region 3. Wheeling, WV. 23pp. and appendices.
12. Stribling, James B., Stephen R. Moulton, and Gary T. Lester, 2003. Determining the quality of taxonomic data. Journal of N. Am. Benthol. Soc. 22(4):621-631.
13. Klemm, D.J., P.A. Lewis, F. Fulk and J.M. Lazorchak. 1990. Macroinvertebrate field and laboratory methods for evaluating the biological integrity of surface waters. EPA/600/4-90/030. U.S. Environmental Protection Agency. Cincinnati, OH. 206pp. and appendices.
14. Kurtenbach, J. 1991. A method for rapid bioassessment of streams in New Jersey using benthic macroinvertebrates. Bull. N. Am. Benth. Soc. 8(1):129.
15. New Jersey Department of Environmental Protection. 2006. Surface and Ground Water Quality Standards. Water Monitoring and Standards. Trenton, NJ.
16. New Jersey Department of Environmental Protection. Data report, 2003. Ambient Biomonitoring Network (AMNET), Lower Delaware Water Region. Bureau of Freshwater and Biological Monitoring. Trenton, NJ. 23pp. & maps and appendices.
17. Kennen, J.G. 1998. Relation of benthic macroinvertebrate community impairment to basin characteristics in New Jersey streams. Fact Sheet FS-057-98. U.S. Geological Survey. West Trenton, NJ.
18. New Jersey Department of Environmental Protection. Data report, 1994. Ambient biomonitoring network, upper Delaware drainage basin. Bureau of Water Monitoring. Trenton. 8pp. and maps and appendices.
19. Dickman, Mike, Ian Brindle, and Martin Benson, 1992. Evidence of teratogens in sediments of the Niagara River Watershed as reflected by chironomid (Diptera: Chironomidae) deformities. Journal of Great Lakes Res. 18(3):467-480.
20. Hamilton, A.L. and O.A. Saether, 1971. The occurrence of characteristic deformities in the chironomid larvae of several Canadian lakes. Canadian Entomologist 103:363-368.
21. Warwick, W.F., 1985. Morphological abnormalities in Chironomidae (Diptera) larvae as measures of toxic stress in freshwater ecosystems: indexing antennal deformities in *Chironomus* Meigen. Canadian Journal of Fisheries and Aquatic Sciences 42:1881-1914.
22. Lenat, David R., 1993. Using mentum deformities of *Chironomus* larvae to evaluate the effects of toxicity and organic loading in streams. Journal of N. Am. Benthol. Soc. 12(3):265-269.
23. Diggins, T.P. and K.M. Stewart, 1993. Deformities of aquatic larval midges (Chironomidae: Diptera) in the sediments of the Buffalo River, New York. Journal of Great Lakes Res. 19(4):648-659
24. New Jersey Department of Environmental Protection. Data report, 1999. Sediment Toxicity Test using the amphipod *Hyalella azteca*, WMA #1 and 11 (Upper Delaware River basin). Assay # 99H002. Bureau of Water Monitoring. Trenton, NJ. 7pp. and maps and appendices.
25. Ayers, M., Kennen, J., Stackleberg, P., Kauffman, L. 2000. Building a stronger scientific basis for landuse planning and watershed management effects on water quality and aquatic communities in NJ streams. USGS. West Trenton, NJ.

TABLE 1

BIOLOGICAL CRITERIA FOR SCREENING WATER QUALITY IN NEW JERSEY FRESHWATER STREAMS*

Scoring Criteria for Rapid Bioassessments[1]

Biometrics	6	3	0
Taxa Richness (total Families)	>10	10-5	4-0
E+P+T Index[2] (EPT)	>5	5-3	2-0
Percent Dominance[3] (%CDF)	<40	40-60	>60
Percent EPT[4] (%EPT)	>35	35-10	<10
Modified Family Biotic Index[5] (FBI)	<5	5-7	>7



NOTE: The previous AMNET reports (1994-1996) contained incorrect number ranges for Modified Family Biotic Index. Using the incorrect numbers could lower the biological assessment on 9% of the sites evaluated. The numbers now presented in this table are correct and scores from previous reports were calculated using these ranges. No incorrect biological assessments exist in the previous reports.

Biological Assessment	Total Score
Non-impaired	24-30
Moderately Impaired	9-21
Severely Impaired	0-6

Attributes

Non-impaired: benthic community comparable to other undisturbed streams within the region; community characterized by a maximum taxa richness, balanced taxa groups, and good representation of intolerant individuals.

Moderately Impaired: macroinvertebrate richness reduced, in particular EPT taxa; reduced community balance and numbers of intolerant taxa.

Severely Impaired: benthic community dramatically different from those in less impaired situations; macroinvertebrates dominated by a few taxa, but with many individuals; only tolerant individuals present.

*
1 From Kurtenbach, 1991, based on RBP II protocols.
2 Follows RBP Protocol II; using 100 organism subsample, family level taxonomy
3 Ephemeroptera, Plecoptera, Trichoptera
4 % contribution of the dominant family
5 Including the hydropsychid family
Also known as the Hilsenhoff Biotic Index

NJ Department of Environmental Protection
Water Monitoring and Standards

AMBIENT BIOMONITORING NETWORK

Northwest Water Region
Upper Delaware and Wallkill River Drainages
Watershed Management Areas 1, 2, and 11
Round 3 Benthic Macroinvertebrate Data
Volume 2 of 2

February 2008

State of New Jersey
Jon S. Corzine, Governor

NJ Department of Environmental Protection
Lisa Jackson, Commissioner

NJ Department of Environmental Protection
Land Use Management
Mark Mauriello, Assistant Commissioner

Water Monitoring and Standards
Leslie McGeorge, Administrator

Bureau of Freshwater & Biological Monitoring
Alfred L. Korndoerfer, Jr., Chief

February 2008

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Water Monitoring Report Prepared By:
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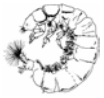

AMBIENT BIOMONITORING NETWORK

Watershed Management Areas 1, 2, and 11

Northwest Water Region

Round 3 Benthic Macroinvertebrate Data

Volume 2 of 2

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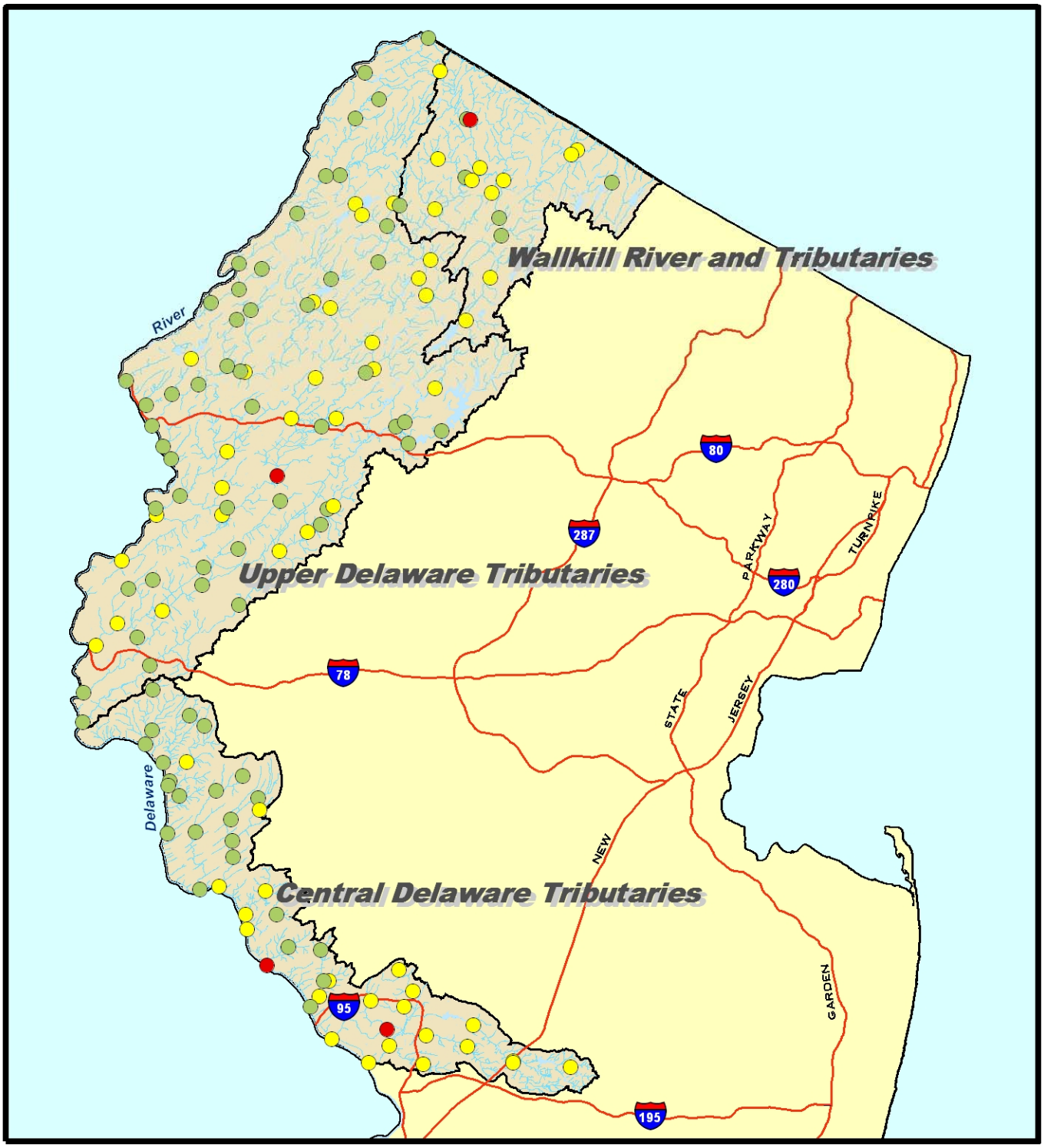
MAPS

Round 3 Upper Delaware Region AMNET Study
WMA's 1, 2, & 11

AMNET site locations and their respective biological ratings, for each major sub-basin, are shown in maps 1- 8. Also identified are sites that exhibited significant and chronic macroinvertebrate abnormalities.

2003 Upper Delaware River Basin AMNET Study



BIOASSESSMENT IMPAIRMENT RATINGS None Moderate Severe

WATERSHED MANAGEMENT AREAS

Map 1

Upper Delaware (Northwest) Water Region

0 4 8 16 24 32 Miles

1 inch equals 10.587610 miles

Map: J. Sell, January 2004

2003 Upper Delaware River Basin AMNET Study

BIOASSESSMENT IMPAIRMENT RATINGS ● None ● Moderate ● Severe

Map 2

Flat, Shimers and Van Campens Brooks

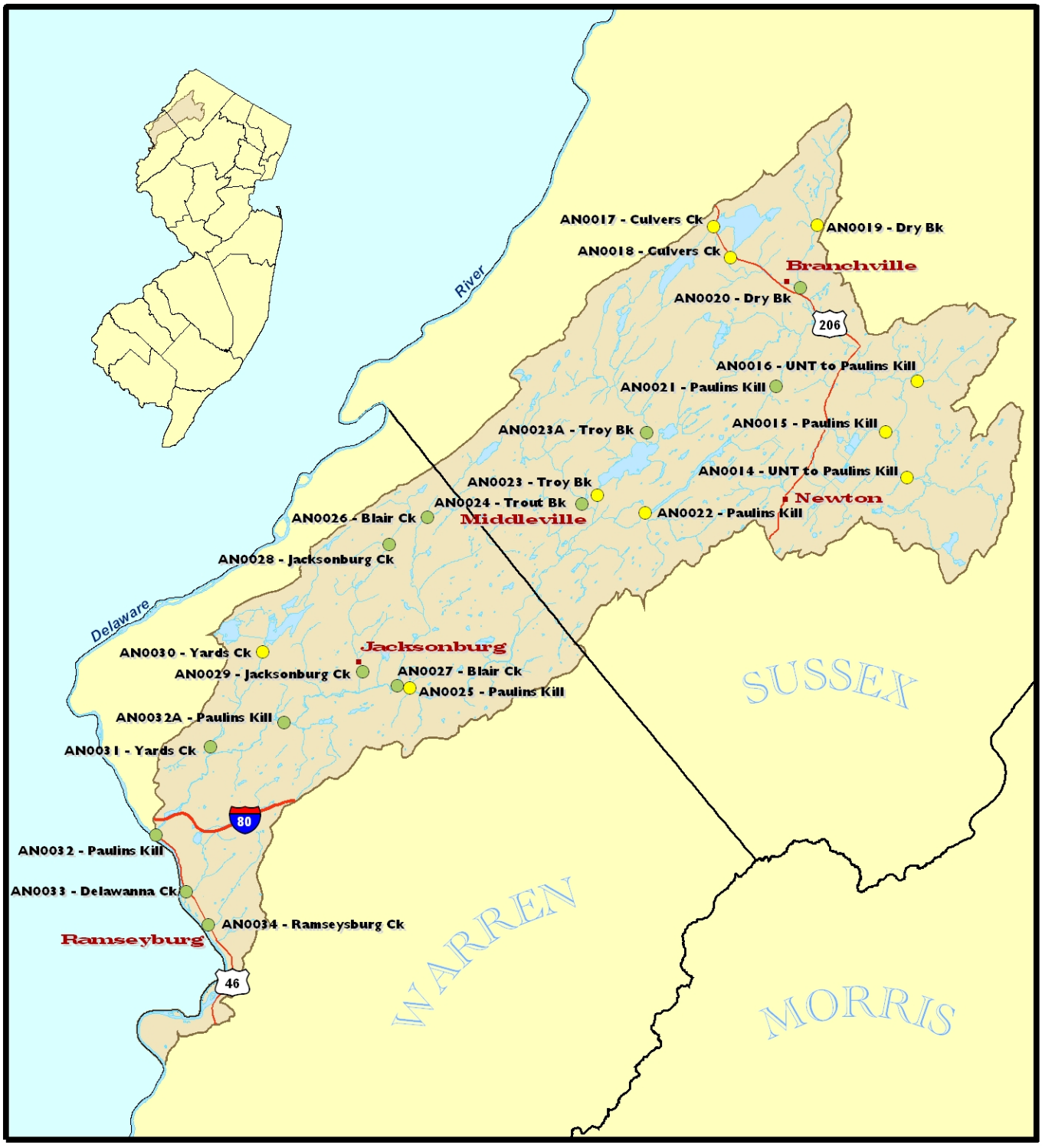
Watershed Management Area 1 (Part)

0 1 2 4 6 8 Miles

1 inch equals 4.077864 miles

Map: J. Sell, January 2004

2003 Upper Delaware River Basin AMNET Study



BIOASSESSMENT IMPAIRMENT RATINGS ● None ● Moderate ● Severe

Map 3

Paulins Kill and Delawanna Creek

Watershed Management Area 1 (Part)

0 1.25 2.5 5 7.5 10 Miles

1 inch equals 3.866172 miles

Map: J. Sell, January 2004

2003 Upper Delaware River Basin AMNET Study

BIOASSESSMENT IMPAIRMENT RATINGS None Moderate Severe

MACROINVERTEBRATE ABNORMALITIES PRESENT

Map 4

Pequest River

Watershed Management Area 1 (Part)

0 1.25 2.5 5 7.5 10 Miles

1 inch equals 3.391327 miles

Map: J. Sell, January 2004

2003 Upper Delaware River Basin AMNET Study

BIOASSESSMENT IMPAIRMENT RATINGS None Moderate Severe

MACROINVERTEBRATE ABNORMALITIES PRESENT

Map 5

Musconetcong River, Lopatcong and Pohatcong Creeks

Watershed Management Area 1 (Part)

0 1.25 2.5 5 7.5 10 Miles

1 inch equals 5.195584 miles

Map: J. Sell, January 2004

2003 Upper Delaware River Basin AMNET Study

BIOASSESSMENT IMPAIRMENT RATINGS None Moderate Severe

MACROINVERTEBRATE ABNORMALITIES PRESENT CHRONIC MACROINVERTEBRATE ABNORMALITIES

Map 6

Lockatong, Alexauken, Moore and Jacobs Creeks

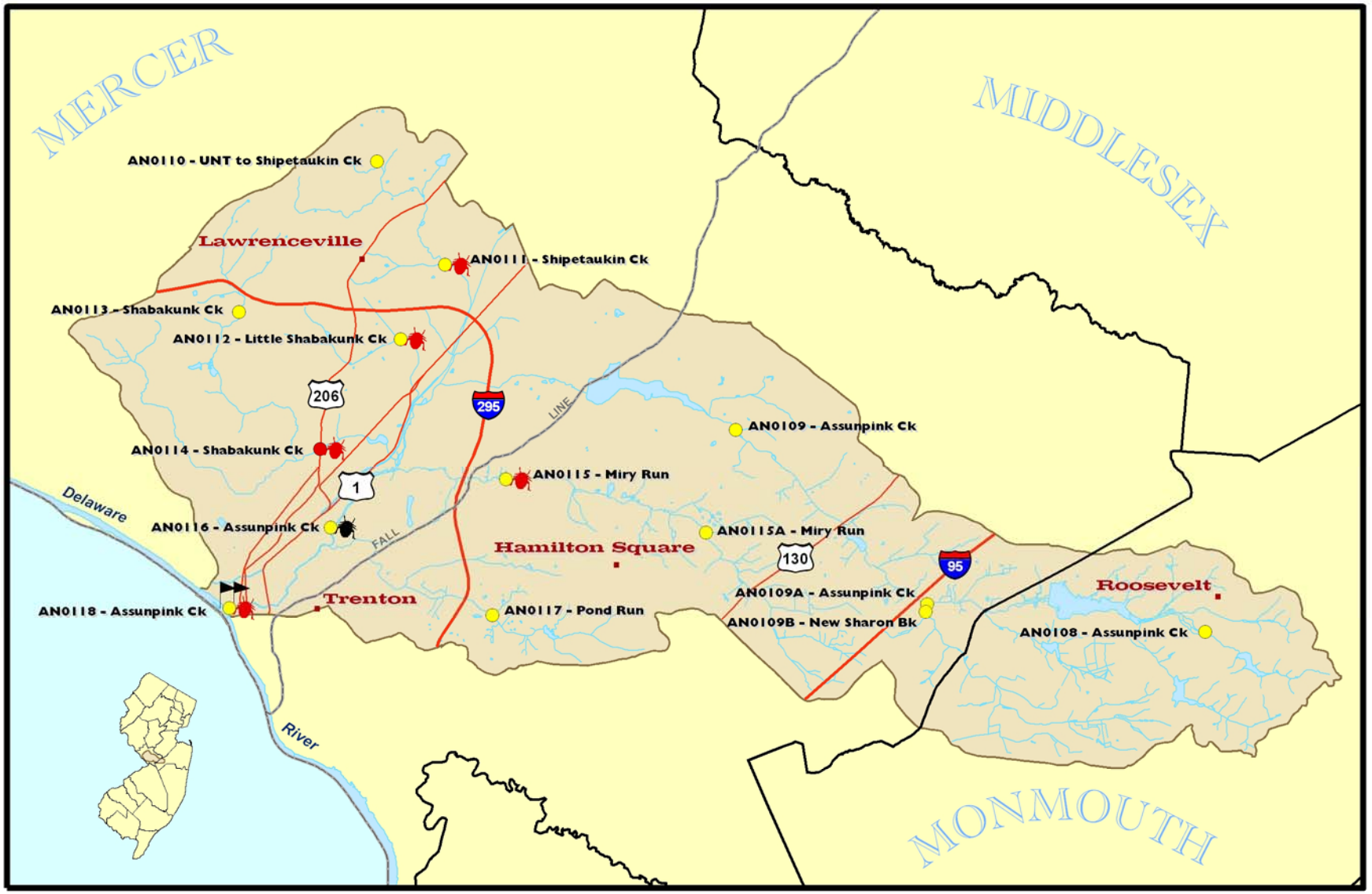
Watershed Management Area 11 (Part)

0 1 2 4 6 8 Miles

1 inch equals 4.124302 miles

Map: J. Sell, January 2004

2003 Upper Delaware River Basin AMNET Study



BIOASSESSMENT IMPAIRMENT RATINGS None Moderate Severe

MACROINVERTEBRATE ABNORMALITIES PRESENT

CHRONIC MACROINVERTEBRATE ABNORMALITIES

HEAD OF TIDE

N

0 1 2 4 6 8 Miles

1 inch equals 2.251069 miles

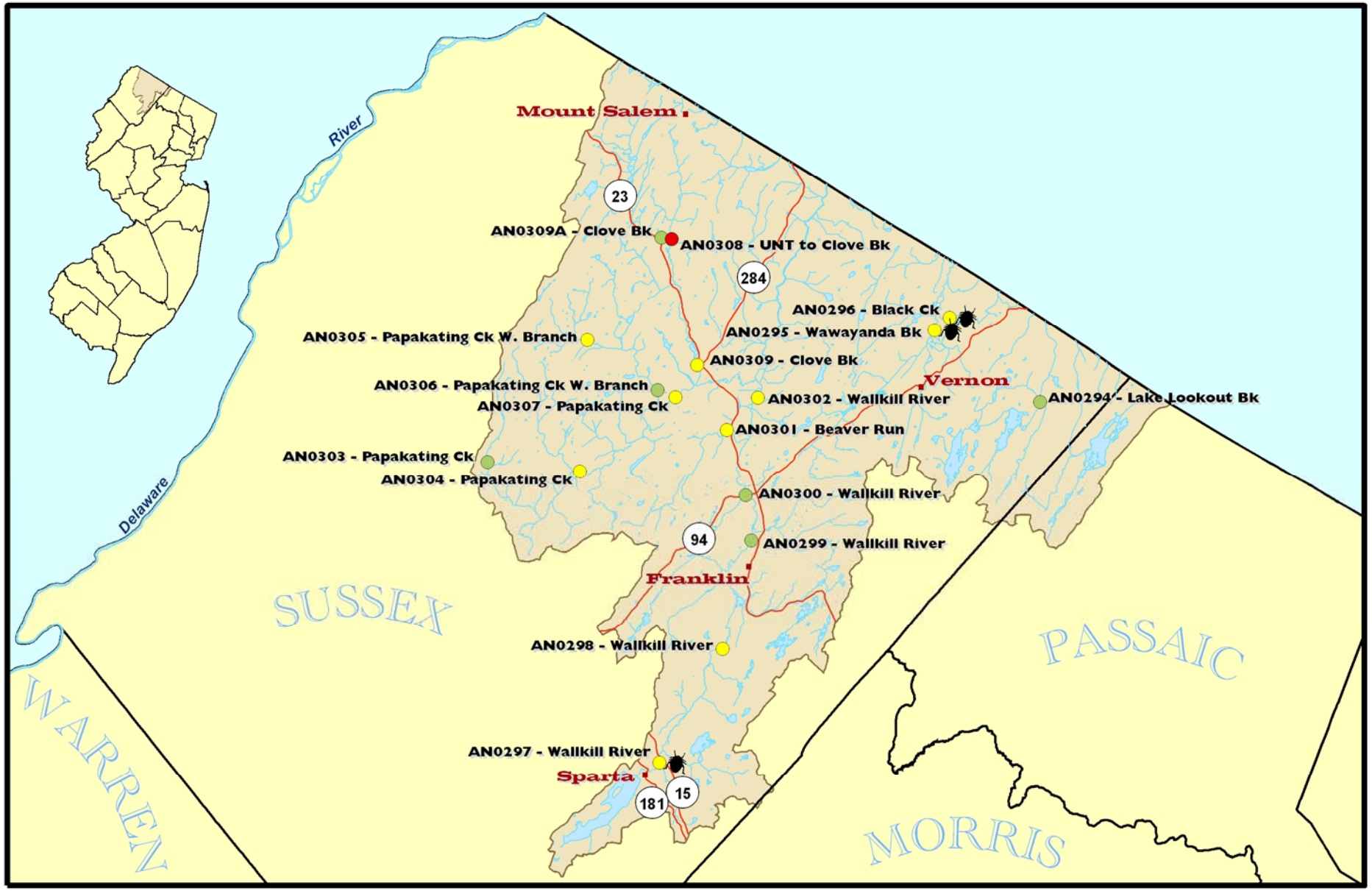
Map: J. Sell, January 2004

Map 7

Assunpink Creek

Watershed Management Area 11 (Part)

2003 Upper Delaware River Basin AMNET Study



BIOASSESSMENT IMPAIRMENT RATINGS None Moderate Severe

MACROINVERTEBRATE ABNORMALITIES PRESENT

Map 8

Wallkill River, Papakating and Pochuck Creeks

Watershed Management Area 2

0 1.25 2.5 5 7.5 10 Miles

1 inch equals 4.145013 miles

Map: J. Sell, January 2004

Table 2

Comparative Scores / Ratings (see notes)

Watershed Management Areas 1 and 11

Station	NJ Impairment Score		Change in Rating	Habitat Score	WMA	Station	NJ Impairment Score		Change in Rating	Habitat Score	WMA	Station	NJ Impairment Score		Change in Rating	Habitat Score	WMA
	97 / 98	02 / 03					97 / 98	02 / 03					97 / 98	02 / 03			
001	9	18	/+	97	1	040	21	12	/-	164	1	081	30	21	—	175	11
002	21	27	+	177	1	040A	18	9	/-	123	1	082	30	30	/	185	11
003	24	30	/+	164	1	041	30	6	—	108	1	083	30	24	/-	159	11
004	30	30	/	186	1	042	21	12	/	151	1	084	21	27	+	159	11
005	30	24	/-	185	1	043	27	30	/+	143	1	085	18	30	+	180	11
005A	30	27	/-	149	1	044	15	18	/+	157	1	086	30	30	/	149	11
006	30	24	/-	188	1	045	30	24	/-	166	1	087	24	27	/+	144	11
007	30	24	/-	180	1	046	24	15	—	131	1	088	30	24	/-	160	11
008	30	27	/-	185	1	047	30	30	/	172	1	089	30	30	/	172	11
009	30	24	/-	195	1	048	30	30	/	158	1	090	15	30	+	157	11
010	30	30	/	169	1	049	30	21	—	160	1	091	21	27	+	165	11
011	27	30	/+	185	1	050	30	21	—	137	1	092	21	21	/	170	11
012	30	30	/	179	1	051	30	30	/	177	1	093	9	27	+	187	11
013	-	30		191	1	052	24	18	—	178	1	094	30	30	/	182	11
014	30	18	—	161	1	053	24	12	—	124	1	095	24	21	—	177	11
015	15	15	/	147	1	054	30	30	/	167	1	096	27	24	/-	138	11
016	15	12	/-	134	1	055	15	27	+	171	1	097	24	21	—	161	11
017	24	12	—	119	1	056	30	30	/	169	1	098	30	21	—	172	11
018	18	12	/-	165	1	057	21	27	+	106	1	099	18	18	/	102	11
019	18	18	/	107	1	058	27	15	—	101	1	100	24	30	/+	116	11
020	-	30		185	1	059	30	27	/-	184	1	101	27	6	—	96	11
021	30	30	/	187	1	060	30	27	/-	145	1	102	27	24	/-	179	11
022	18	21	/+	162	1	061	24	30	/+	179	1	103	30	21	—	190	11
023	-	12		171	1	062	21	27	+	159	1	104	18	15	/-	130	11
023A	30	24	/-	170	1	063	30	30	/	170	1	105	24	30	/+	165	11
024	30	30	/	178	1	064	30	24	/-	176	1	106	24	24	/	176	11
025	27	15	—	168	1	065	27	21	—	154	1	107	24	15	—	151	11
026	27	24	/-	157	1	066	27	24	/-	167	1	108	9	12	/+	144	11
027	30	27	/-	142	1	067	30	18	—	168	1	109	9	12	/+	160	11
028	30	24	/-	163	1	068	21	27	+	189	1	109A	12	9	/-	156	11
029	30	30	/	154	1	069	30	27	/-	189	1	109B	15	12	/-	152	11
030	21	18	/-	125	1	070	15	21	/+	182	1	110	12	15	/+	192	11
031	30	30	/	139	1	071	30	21	—	169	1	111	12	15	/+	139	11
032	18	30	+	182	1	072	15	24	+	193	1	112	12	9	/-	128	11
032A	30	30	/	173	1	073	30	30	/	195	1	113	15	18	/+	151	11
033	27	24	/-	133	1	074	27	30	/+	173	1	114	18	6	—	100	11
034	-	27		167	1	075	30	30	/	184	11	115	15	12	/-	140	11
035	12	12	/	114	1	076	30	30	/	184	11	115A	18	12	/-	153	11
036	9	12	/+	139	1	077	30	30	/	123	11	116	15	12	/-	157	11
037	30	27	/-	147	1	078	30	24	/-	158	11	117	6	9	+	141	11
038	21	21	/	118	1	079	30	27	/-	174	11	118	9	12	/+	122	11
039	27	30	/+	156	1	080	30	27	/-	170	11						

NOTES:

Comparison of NJ impairment score results between earliest and latest sampling dates:

+ indicates positive change in rating
— indicates negative change in rating
/ indicates no change in rating
/+ or /- indicates change in score, but not in rating (see Table 1)

NJ Impairment Score	Value
Non-Impaired	24 - 30
Moderately Impaired	9 - 21
Severely Impaired	0 - 6

Habitat Score	Value
Optimal	160 - 200
Sub-optimal	110 - 159
Marginal	60 - 109
Poor	<60

Table 2 (cont)

Comparative Scores / Ratings (see notes)

Watershed Management Area 2

Station	NJ Impairment Score		Change in Rating	Habitat Score	WMA	Station	NJ Impairment Score		Change in Rating	Habitat Score	WMA	Station	NJ Impairment Score		Change in Rating	Habitat Score	WMA
	97 / 98	02 / 03					97 / 98	02 / 03					97 / 98	02 / 03			
294	21	27	+	162	2												
295	21	21	/	86	2												
296	9	15	/+	134	2												
297	21	18	/-	191	2												
298	18	21	/+	179	2												
299	18	24	+	190	2												
300	15	24	+	138	2												
301	21	18	/-	131	2												
302	21	12	/-	145	2												
303	30	24	/-	182	2												
304	12	18	/+	133	2												
305	27	15	—	166	2												
306	21	30	+	187	2												
307	18	18	/	99	2												
308	18	3	—	128	2												
309	15	15	/	134	2												
309A	30	30	/	187	2												

NOTES:

Comparison of NJ impairment score with earlier study results:

+ indicates positive change in rating
— indicates negative change in rating
/ indicates no change in rating
/+ or /- indicates change in score, but not in rating (see Table 1)

NJ Impairment Score	Value
Non-Impaired	24 - 30
Moderately Impaired	9 - 21
Severely Impaired	0 - 6

Habitat Score	Value
Optimal	160 - 200
Sub-optimal	110 - 159
Marginal	60 - 109
Poor	<60

Table 3

Macroinvertebrate Abnormalities (see notes)

Watershed Management Areas 1, 2, and 11

Station	1997 / 98	2002 / 03	WMA			Station	1997 / 98	2002 / 03	WMA				
004	1/9 *		1			089	1/22	+1	11				
007	1/26		1			091		1/47	11				
014	4/15 *		1			093	1/62		11				
019	1/8 *		1			097		1/120	11				
027	2/16 *		1			098		1/62	11				
028	1/11, +1 *		1			099	3/24 *		11				
031	2/6 *		1			100	3/22 *	1/31	11				
035	4/27 *		1			101	+1		11				
038	1/44		1			104	+3		11				
039	4/11 *		1			105	3/24 *		11				
041	2/12 *		1			106	4/18, +1 *	2/41	11				
042	3/9, +10 *		1			109	+1		11				
043	1/30		1			109A	+3		11				
044		1/78	1			109B	1/15 *		11				
045	4/20 *		1			111	3/24 *	1/47	11				
052	1/43		1			112	2/21 *	1/50	11				
053		+2	1			113	1/39		11				
054	1/13 *		1			114	1/33	1/18 *	11				
055	1/12 *		1			115	+1	+1	11				
058	3/8 *		1			115A	1/26		11				
061	1/10, +1 *		1			116		+1, 1/15 *	11				
064	+1		1			118	+13	1/12 *	11				
065	3/9, +1 *		1			295		+2	2				
067	1/36		1			296		+1	2				
069	+1		1			297		+1	2				
070	2/46		1										
072	2/29, +2 *		1										
073	+1		1										
075	1/9 *		11										
076	1/25		11										
078	1/16 *		11										
079	1/13 *		11										
080	2/33 *		11										
085	3/54 *		11										
088		1/49	11										

NOTES:

chironomids with deformities / # chironomids examined

+ — indicates the number of non-chironomids having abnormalities

* — indicates significant levels (> 5%), although not statistically evaluated

abnormalities considered chronic if they appear in both the 1997 / 1998 and the 2002 / 03 columns

Table 4 — **HABITAT ASSESSMENT FOR *HIGH* GRADIENT STREAMS**

Habitat Parameter	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
1. Epifaunal Substrate/Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regimes	All 4 velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (slow is <0.3 m/s, deep is >0.5 m)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity / depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yrs.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, under story shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

HABITAT SCORES	VALUE
OPTIMAL	160 X 200
SUB-OPTIMAL	110 X 159
MARGINAL	60 X 109
POOR	< 60

Table 4 (cont.) — **HABITAT ASSESSMENT FOR *LOW* GRADIENT STREAMS**

Habitat Parameter	Condition Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
1. Epifaunal Substrate/Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% <20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yrs.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. In stream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, under story shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

HABITAT SCORES	VALUE
OPTIMAL	160 X 200
SUB-OPTIMAL	110 X 159
MARGINAL	60 X 109
POOR	< 60

Table 5 - List of AMNET sites with Parameters that did not attain standards:

Amnet#	Stream Name	Station Location	Non-Attaining Parameter(s)
AN0012*	Dunnfield Ck	off of I-80 Westbound	pH
AN0013*	Stony Bk	Stark Rd	TDS
AN0015	Paulins Kill	Rt 663	Tot Phos , DO
AN0022	Paulins Kill	Rt 614 (outlet to Paulinskill Lk)	Temp
AN0023	Troy Bk	outlet of Swartswood Lk	Temp
AN0024*	Trout Bk	Rt 612 & 521	Temp
AN0025	Paulins Kill	off Sunset Hill Rd	Temp
AN0032*	Paulins Kill	Rt 46	Temp
AN0032A*	Paulins Kill	Vail Rd	Temp
AN0041	Pequest River	Cemetery Rd	Tot Phos, pH, TSS
AN0043*	Pequest R	Rt 625	Tot Phos, pH, TSS
AN0046	Honey Run	Rt 519	DO
AN0048*	Pequest R	off Water St nr. confluence with Delaware River	Tot Phos, pH, Temp
AN0054*	Pohatcong Ck	Jane(s) Chapel Rd	Temp
AN0055*	Pohatcong Ck	Rt 650	Temp
AN0057*	Pohatcong Ck	Buttermilk Bridge Rd	Tot Phos, pH, Temp
AN0058	Pohatcong Ck	Edison Rd	Tot Phos, pH, Temp
AN0061*	Pohatcong Ck	Carpentersville Rd (River Rd)	Tot Phos
AN0062*	Musconetcong R	outlet of Lk Hopatcong Rt 607	pH, Temp
AN0068*	Trout Bk	Rt 57	Temp
AN0069*	Musconetcong R	Kings Hwy	Temp
AN0072*	Musconetcong R	Springtown Rd New Hampton Rd	pH
AN0073*	Musconetcong R	Rt 579	pH
AN0074*	Musconetcong R	River Rd (Rt 627)	Tot Phos, pH, TSS
AN0075*	Hakihokake Ck	Myler Rd	pH, Temp
AN0076*	Hakihokake Ck	Miller Park Rd	pH, Temp
AN0077*	Hakihokake Ck	Bridge St	pH, Temp
AN0086*	Lockatong Ck	Oak Grove Rd	Tot Phos, Temp
AN0087*	Lockatong Ck	Rt 12	Tot Phos, Temp
AN0088*	Lockatong Ck	Rt 519	Tot Phos, Temp
AN0089*	Lockatong Ck	Rt 29	Tot Phos, Temp
AN0095	Wickecheoke Ck	Rt 29	Tot Phos, Temp
AN0103	Airport Br of Jacobs Ck	Rt 579	pH
AN0106*	Jacobs Ck	Rt 29	pH
AN0109B	New Sharon Bk	Sharon Rd	Tot Phos
AN0115	Miry Run	Rt 533 (Quakerbridge Rd)	Tot Phos, DO, pH
AN0115A	Miry Run	Pond Rd	Tot Phos, DO, pH
AN0116	Assunpink Ck	Mulberry St	Tot Phos
AN0295	Wawayanda Bk	Canal Rd	Tot Phos, Temp
AN0296	Black Ck	Marker Rd (Maple Grange Rd)	Tot Phos
AN0297	Wallkill R	Rt 15	Temp
AN0298	Wallkill R	Kennedy Ave	Temp

* non impaired AMNET site

results from the NJDEP 2004 Integrated List

Appendix A — Station Numbers and Locations for the Round 3 Upper Delaware Region AMNET Study

Site	Stream	Latitude Longitude	Watershed Management Area
AN0001	Clove Bk	41 18'53.373"N 74 40'07.154"W	1
AN0002	Clove Bk	41 21'06.335"N 74 41'10.161"W	1
AN0003	Shimers Bk	41 18'46.731"N 74 46'43.451"W	1
AN0004	Little Flat Bk	41 17'02.719"N 74 45'29.275"W	1
AN0005	Little Flat Bk	41 15'45.716"N 74 47'33.516"W	1
AN0005A	Little Flat Bk	41 11'54.521"N 74 50'08.747"W	1
AN0006	Big Flat Bk	41 12'00.054"N 74 48'55.832"W	1
AN0007	Flat Bk	41 09'25.965"N 74 52'38.074"W	1
AN0008	Flat Bk	41 06'05.606"N 74 57'43.855"W	1
AN0009	Van Campens Bk	41 05'43.209"N 74 55'45.708"W	1
AN0010	Van Campens Bk	41 04'22.070"N 74 57'45.202"W	1
AN0011	Van Campens Bk	41 03'27.651"N 75 00'11.308"W	1
AN0012	Dunnfield Ck	40 58'14.065"N 75 07'34.898"W	1
AN0013	Stony Bk	40 56'38.309"N 75 05'48.808"W	1
AN0014	UNT to Paulins Kill	41 04'00.778"N 74 41'15.963"W	1
AN0015	Paulins Kill	41 05'07.878"N 74 41'57.964"W	1
AN0016	UNT to Paulins Kill	41 06'21.295"N 74 40'56.237"W	1
AN0017	Culvers Ck	41 10'05.657"N 74 47'30.702"W	1
AN0018	Culvers Ck	41 09'21.025"N 74 46'57.541"W	1
AN0019	Dry Bk	41 10'09.042"N 74 44'10.326"W	1
AN0020	Dry Bk	41 08'36.840"N 74 44'43.274"W	1
AN0021	Paulins Kill	41 06'13.513"N 74 45'29.351"W	1
AN0022	Paulins Kill	41 03'08.907"N 74 49'40.505"W	1
AN0023	Troy Bk	41 03'33.471"N 74 51'11.835"W	1
AN0023A	Troy Bk	41 05'05.510"N 74 49'37.287"W	1
AN0024	Trout Bk	41 03'20.519"N 74 51'41.591"W	1
AN0025	Paulins Kill	40 58'52.121"N 74 57'12.460"W	1
AN0026	Blair Ck	41 03'00.829"N 74 56'40.113"W	1
AN0027	Blair Ck	40 58'54.804"N 74 57'35.356"W	1
AN0028	Jacksonburg Ck	41 02'20.775"N 74 57'53.670"W	1
AN0029	Jacksonburg Ck	40 59'14.684"N 74 58'43.178"W	1
AN0030	Yards Ck	40 59'43.000"N 75 01'55.902"W	1

Site	Stream	Latitude Longitude	Watershed Management Area
AN0031	Yards Ck	40 57'23.847"N 75 03'34.777"W	1
AN0032	Paulins Kill	40 55'15.243"N 75 05'17.479"W	1
AN0032A	Paulins Kill	40 58'00.450"N 75 01'14.763"W	1
AN0033	Delawanna Ck	40 53'52.815"N 75 04'19.347"W	1
AN0034	Ramseysburg Ck	40 53'05.044"N 75 03'36.520"W	1
AN0035	Pequest R	41 00'51.811"N 74 45'59.931"W	1
AN0036	UNT to Pequest R	40 59'07.663"N 74 45'52.968"W	1
AN0037	Pequest R	40 58'50.814"N 74 46'35.360"W	1
AN0038	Trout Bk	40 55'48.127"N 74 49'08.167"W	1
AN0039	Pequest R	40 55'17.022"N 74 50'25.852"W	1
AN0040	Bear Ck	40 55'48.566"N 74 53'05.961"W	1
AN0040A	Bear Ck	40 58'30.344"N 74 50'57.831"W	1
AN0041	Pequest R	40 51'58.398"N 74 54'19.347"W	1
AN0042	Furnace Bk	40 49'21.769"N 74 59'06.341"W	1
AN0043	Pequest R	40 49'49.847"N 74 58'39.953"W	1
AN0044	Mountain Lake Bk	40 51'10.847"N 74 59'07.246"W	1
AN0045	Beaver Bk	40 56'33.270"N 74 56'32.780"W	1
AN0046	Honey Run	40 53'33.971"N 74 58'40.558"W	1
AN0047	Beaver Bk	40 50'36.857"N 75 02'46.374"W	1
AN0048	Pequest R	40 49'45.841"N 75 04'55.768"W	1
AN0049	Pophandusing Bk	40 49'20.221"N 75 04'50.983"W	1
AN0050	Buck Horn Ck	40 46'17.971"N 75 07'50.883"W	1
AN0051	Lopatcong Ck	40 44'24.624"N 75 07'15.934"W	1
AN0052	Lopatcong Ck	40 42'07.878"N 75 08'12.891"W	1
AN0053	Lopatcong Ck	40 40'38.350"N 75 10'01.855"W	1
AN0054	Pohatcong Ck	40 50'18.689"N 74 53'59.968"W	1
AN0055	Pohatcong Ck	40 47'06.111"N 74 57'41.175"W	1
AN0056	Brass Castle Ck	40 45'53.533"N 75 00'43.295"W	1
AN0057	Pohatcong Ck	40 44'41.365"N 75 00'49.018"W	1
AN0058	Pohatcong Ck	40 42'57.959"N 75 04'18.230"W	1
AN0059	Merrill Ck	40 45'00.107"N 75 05'06.940"W	1
AN0060	Merrill Ck	40 41'11.491"N 75 06'29.268"W	1

Appendix A — Station Numbers and Locations for the Round 3 Upper Delaware Region AMNET Study

Site	Stream	Latitude Longitude	Watershed Management Area
AN0061	Pohatcong Ck	40 37'29.855"N 75 11'08.755"W	1
AN0062	Musconetcong R	40 55'01.431"N 74 39'56.687"W	1
AN0063	Musconetcong R	40 54'08.398"N 74 42'48.549"W	1
AN0064	Musconetcong R	40 55'15.877'N 74 43'54.037"W	1
AN0065	Lubbers Run	40 57'51.270"N 74 40'28.210"W	1
AN0066	Lubbers Run	40 55'35.979"N 74 43'07.086"W	1
AN0067	Mine Brook	40 49'58.240"N 74 49'22.029"W	1
AN0068	Trout Brook	40 49'46.217"N 74 49'52.241"W	1
AN0069	Musconetcong R	40 48'46.767"N 74 50'29.995"W	1
AN0070	Hances Brook	40 48'16.140"N 74 51'37.606"W	1
AN0071	UNT to Musconetcong R	40 47'00.267"N 74 54'02.633"W	1
AN0072	Musconetcong R	40 43'22.996"N 74 57'35.801"W	1
AN0073	Musconetcong R	40 39'19.616"N 75 05'19.716"W	1
AN0074	Musconetcong R	40 35'33.407"N 75 11'17.230"W	1
AN0075	Hakihokake Ck	40 37'42.344"N 75 05'04.447"W	11
AN0076	Hakihokake Ck	40 35'02.591"N 75 05'07.655"W	11
AN0077	Hakihokake Ck	40 34'06.359"N 75 05'42.610"W	11
AN0078	Harihokake Ck	40 36'00.393"N 75 01'50.641"W	11
AN0079	Harihokake Ck	40 32'53.072"N 75 04'07.766"W	11
AN0080	Nishisakawick Ck	40 35'20.651"N 75 00'34.071"W	11
AN0081	Nishisakawick Ck	40 32'56.275"N 75 02'03.953"W	11
AN0082	Nishisakawick Ck	40 31'38.526"N 75 03'32.940"W	11
AN0083	Little Nishisakawick Ck	40 31'22.623"N 75 03'41.890"W	11
AN0084	Copper Ck	40 30'39.544"N 75 02'43.388"W	11
AN0085	Warford Ck	40 28'09.916"N 75 03'43.655"W	11
AN0086	Lockatong Ck	40 32'02.357"N 74 57'11.604"W	11
AN0087	Lockatong Ck	40 31'01.719"N 74 59'30.835"W	11
AN0088	Lockatong Ck	40 28'16.532"N 75 01'16.150"W	11
AN0089	Lockatong Ck	40 24'28.293"N 75 00'50.967"W	11
AN0090	Wickecheoke Ck	40 30'34.613"N 74 55'49.813"W	11
AN0091	Wickecheoke Ck	40 29'08.865"N 74 58'13.799"W	11
AN0092	Plum Brook	40 29'46.410"N 74 55'40.768"W	11
AN0093	Plum Brook	40 27'49.932"N 74 58'04.041"W	11
AN0094	Wickecheoke Ck	40 26'38.138"N 74 57'57.999"W	11
AN0095	Wickecheoke Ck	40 24'41.329"N 74 59'11.194"W	11
AN0096	Alexauken Ck	40 22'49.353"N 74 54'10.197"W	11
AN0097	UNT to Alexauken Ck	40 24'22.175"N 74 55'10.615"W	11
AN0098	Alexauken Ck	40 22'50.158"N 74 56'52.659"W	11
AN0099	Swan Ck	40 21'50.273"N 74 56'42.853"W	11
AN0100	Moores Ck	40 20'39.621"N 74 53'08.715"W	11
AN0101	Moores Ck	40 19'26.394"N 74 55'01.395"W	11
AN0102	Jacobs Ck	40 20'29.374"N 74 50'18.357"W	11
AN0103	Airport Br of Jacobs Ck	40 17'24.047"N 74 50'26.702"W	11
AN0104	Woolseys Bk	40 18'27.419"N 74 49'35.358"W	11
AN0105	Jacobs Ck	40 18'25.937"N 74 50'01.804"W	11
AN0106	Jacobs Ck	40 16'42.298"N 74 51'12.939"W	11
AN0107	Gold Run	40 14'34.962"N 74 49'19.588"W	11
AN0108	Assunpink Ck	40 12'43.204"N 74 28'37.300"W	11
AN0109	Assunpink Ck	40 15'29.782"N 74 37'03.130"W	11
AN0109A	Assunpink Ck	40 13'06.002"N 74 33'37.024"W	11
AN0109B	New Sharon Br	40 12'59.755"N 74 33'38.479"W	11
AN0110	UNT to Shipetaukin Ck	40 19'11.335"N 74 43'30.882"W	11
AN0111	Shipetaukin Ck	40 17'46.003"N 74 42'17.453"W	11
AN0112	Little Shabakunk Ck	40 16'44.226"N 74 43'03.763"W	11
AN0113	Shabakunk Ck	40 17'06.648"N 74 45'59.203"W	11
AN0114	Shabakunk Ck	40 15'13.579"N 74 44'31.498"W	11
AN0115	Miry Run	40 14'49.546"N 74 41'13.758"W	11
AN0115A	Miry Run	40 14'04.950"N 74 37'35.147"W	11
AN0116	Assunpink Ck	40 14'08.450"N 74 44'19.749"W	11
AN0117	Pond Run	40 12'56.316"N 74 41'25.388"W	11
AN0118	Assunpink Ck	40 13'01.939"N 74 45'58.939"W	11
AN0294	Lake Lookout Bk	41 11'31.864"N 74 24'58.251"W	2
AN0295	Wawayanda Ck	41 13'40.705"N 74 28'02.504"W	2
AN0296	Black Ck	41 13'22.080"N 74 28'32.078"W	2

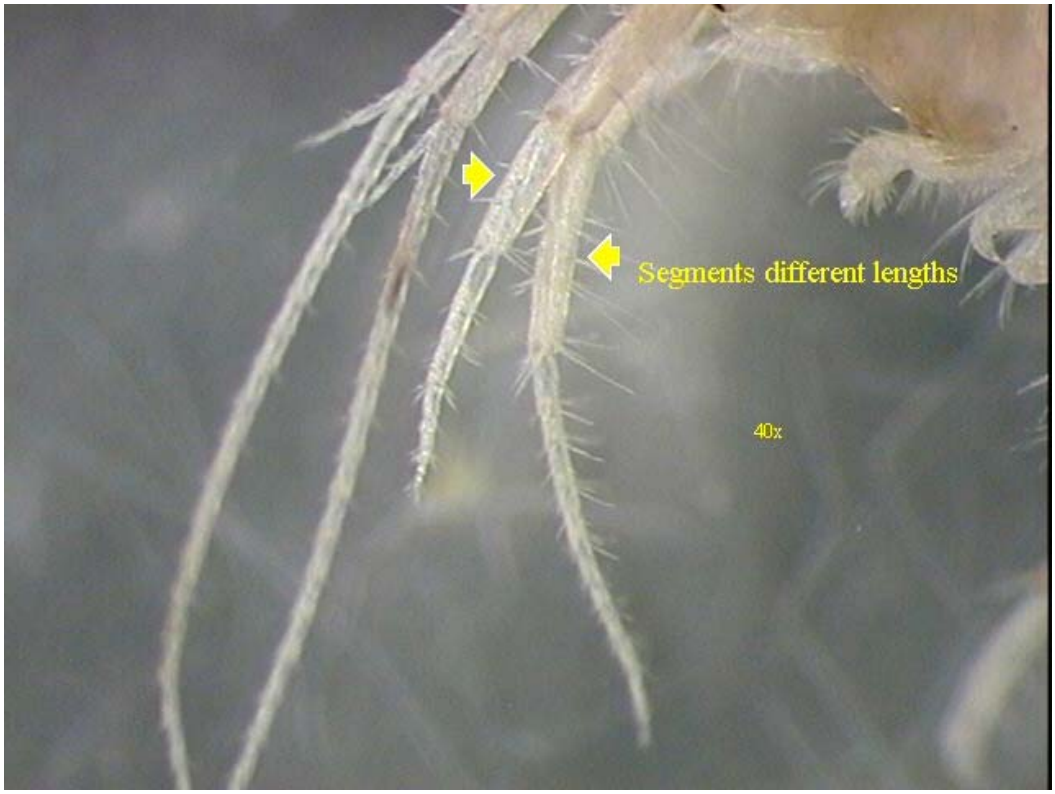
Appendix A — Station Numbers and Locations for the Round 3 Upper Delaware Region AMNET Study

Site	Stream	Latitude Longitude	Watershed Management Area
AN0297	Wallkill R	41 02'20.323"N 74 37'48.469"W	2
AN0298	Wallkill R	41 05'12.932"N 74 35'41.539"W	2
AN0299	Wallkill R	41 08'00.210"N 74 34'43.645"W	2
AN0300	Wallkill R	41 09'09.255"N 74 34'54.492"W	2
AN0301	Beaver Run	41 10'49.311"N 74 35'33.715"W	2
AN0302	Wallkill R	41 11'38.230"N 74 34'30.320"W	2
AN0303	Papakating Ck	41 09'59.891"N 74 43'37.885"W	2
AN0304	Papakating Ck	41 09'45.418"N 74 40'31.047"W	2
AN0305	W Br Papakating Ck	41 13'05.916"N 74 40'16.315"W	2
AN0306	W Br Papakating Ck	41 11'49.793"N 74 37'53.861"W	2
AN0307	Papakating Ck	41 11'38.765"N 74 37'17.144"W	2
AN0308	UNT to Clove Bk	41 15'41.160"N 74 37'25.749"W	2
AN0309	Clove Bk	41 12'28.256"N 74 36'33.133"W	2
AN0309A	Clove Bk	41 15'43.069"N 74 37'48.196"W	2

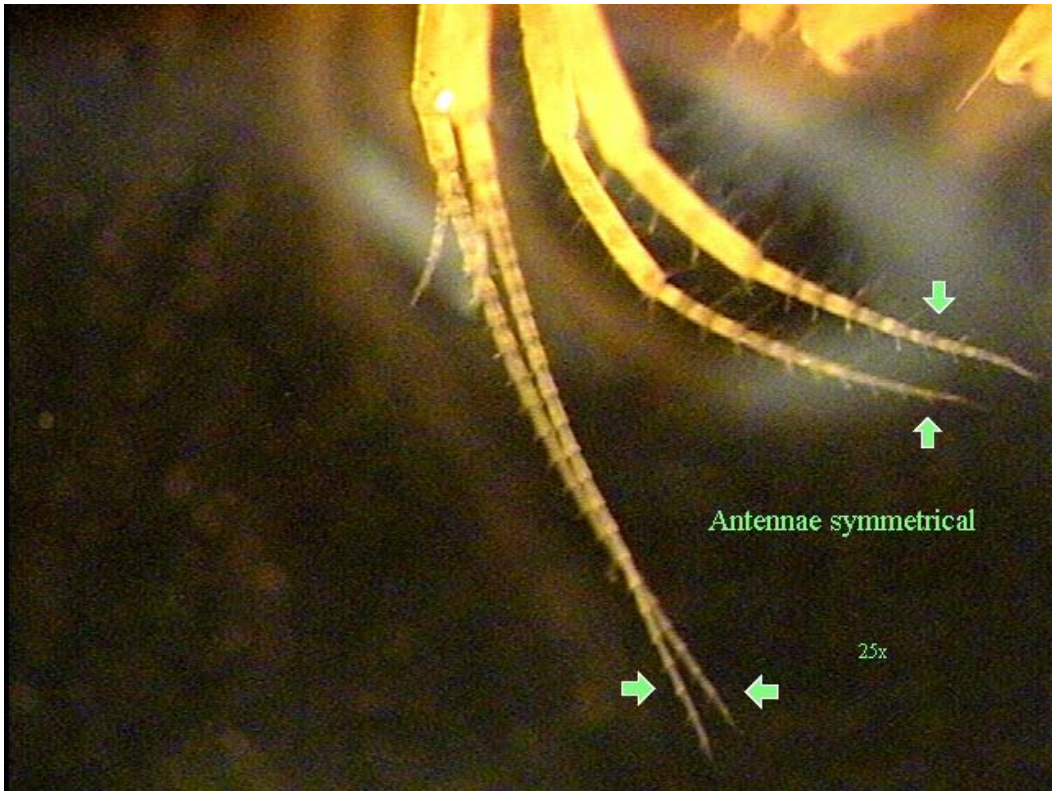
APPENDIX B

Pictures of Morphological Abnormalities in Larval Chironomidae and Amphipoda Recovered in Recent AMNET Surveys

Gammarus fasciatus with second antennae showing different lengths

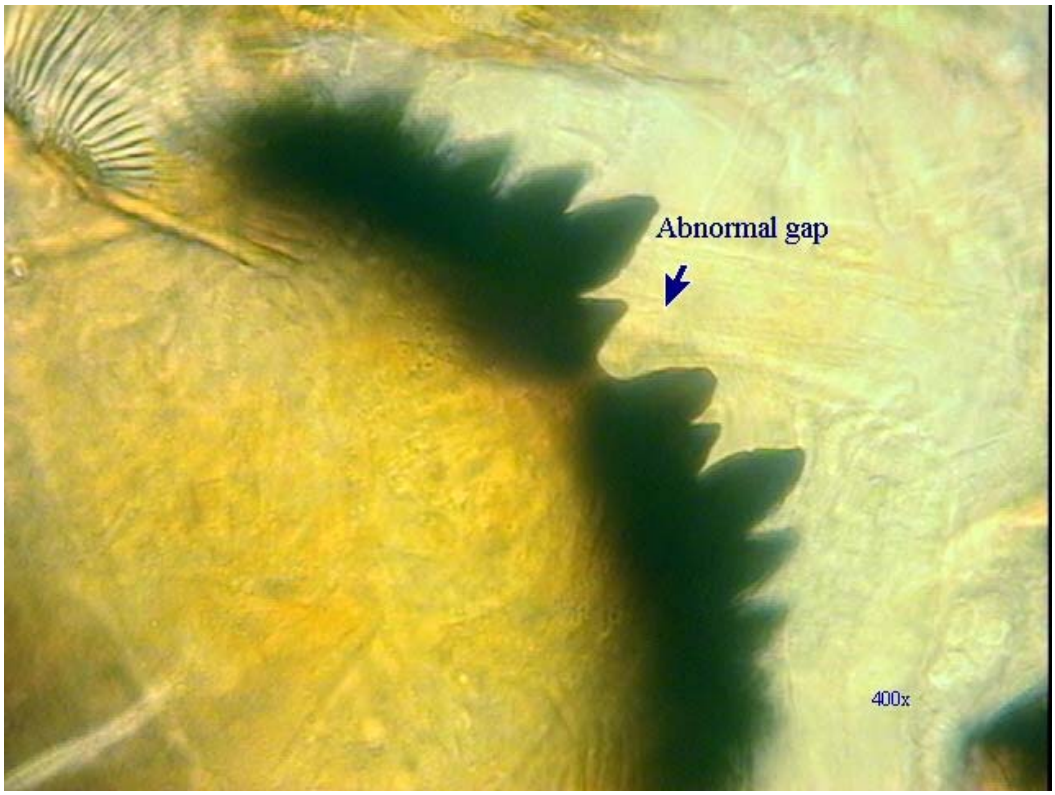


Gammarus fasciatus with normal antennae (showing antennal pairs of same length)

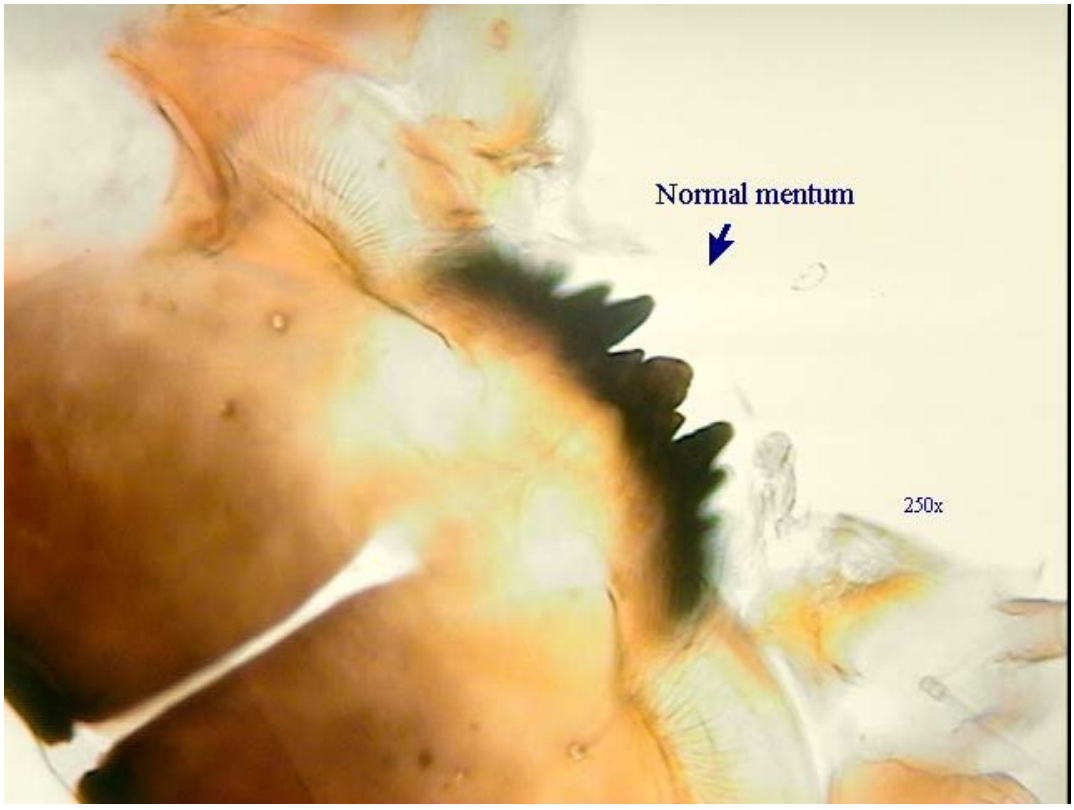


All photographs taken by D.Bryson, NJDEP

Chironomus species with mentum abnormality



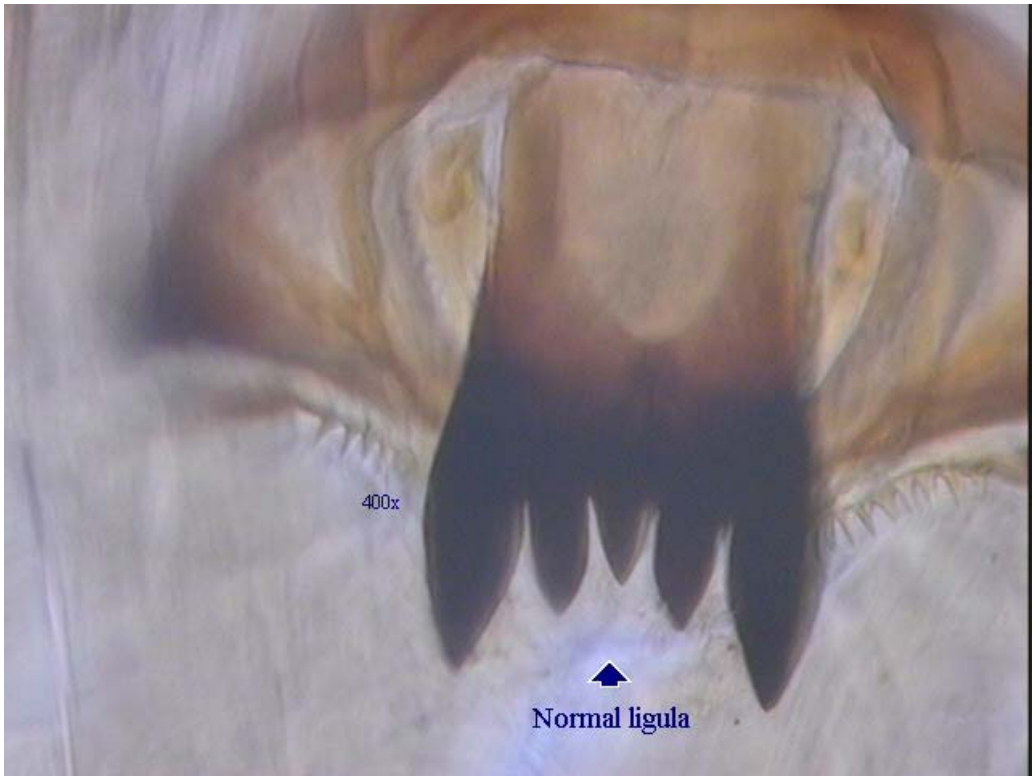
Chironomus species with normal mentum



All photographs taken by D.Bryson, NJDEP

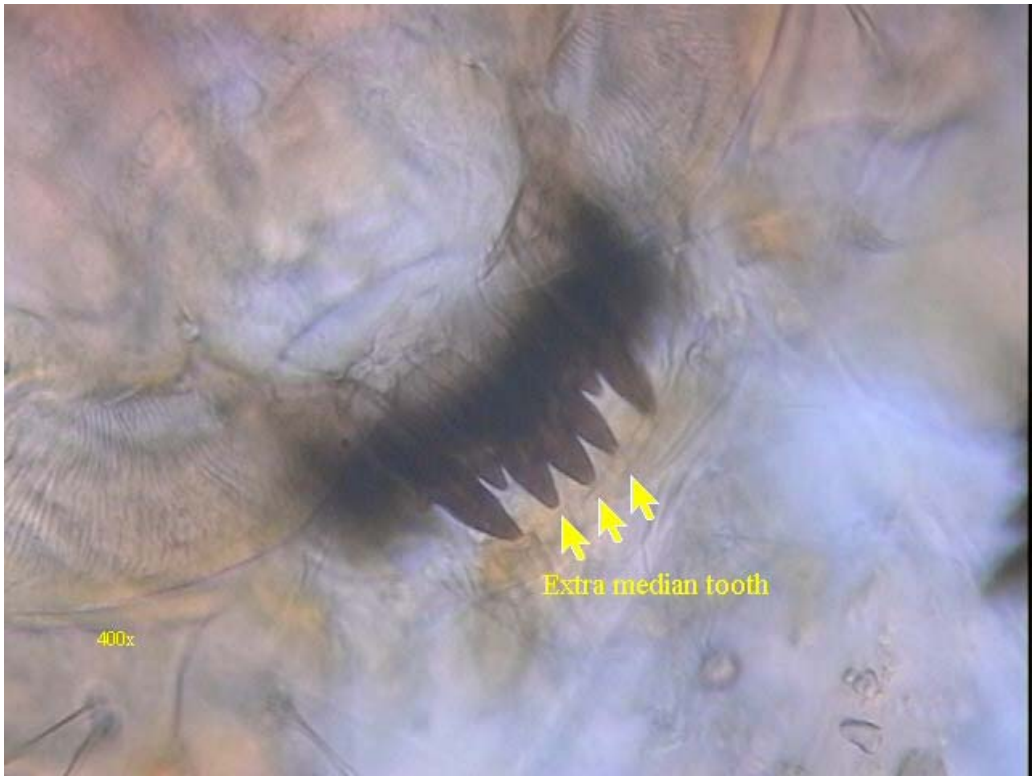
Procladius species with abnormal ligula

Procladius species with normal ligula

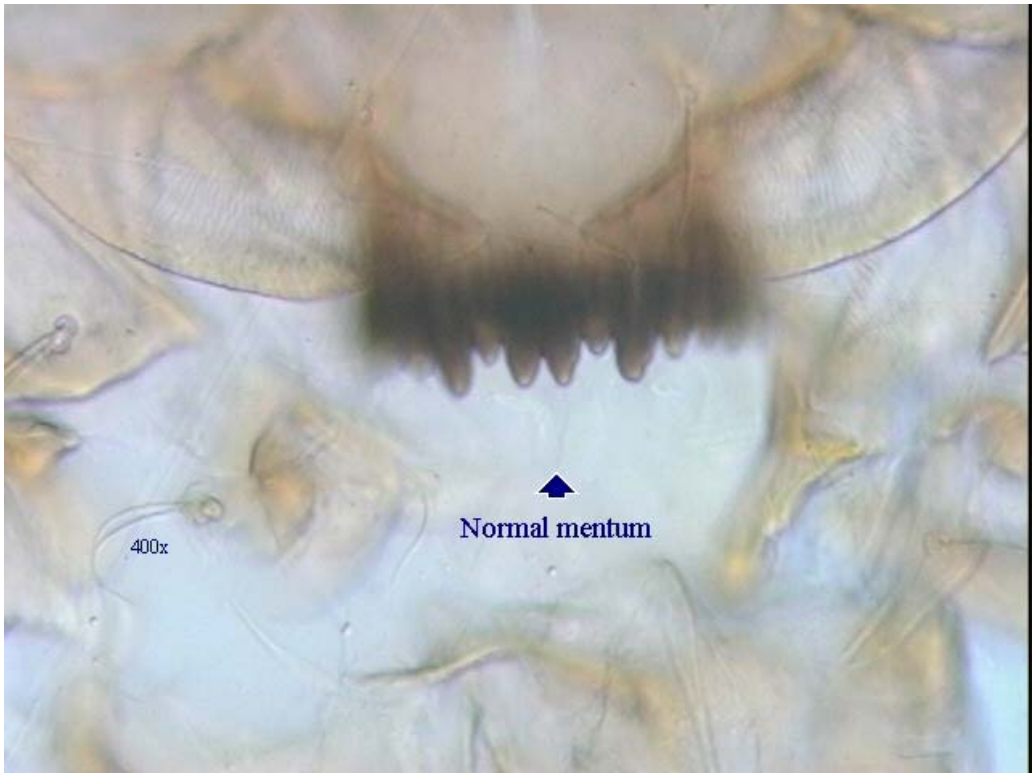


All photographs taken by D.Bryson, NJDEP

Polypedilum species with abnormal mentum



Polypedilum species with normal mentum



All photographs taken by D.Bryson, NJDEP

APPENDIX C

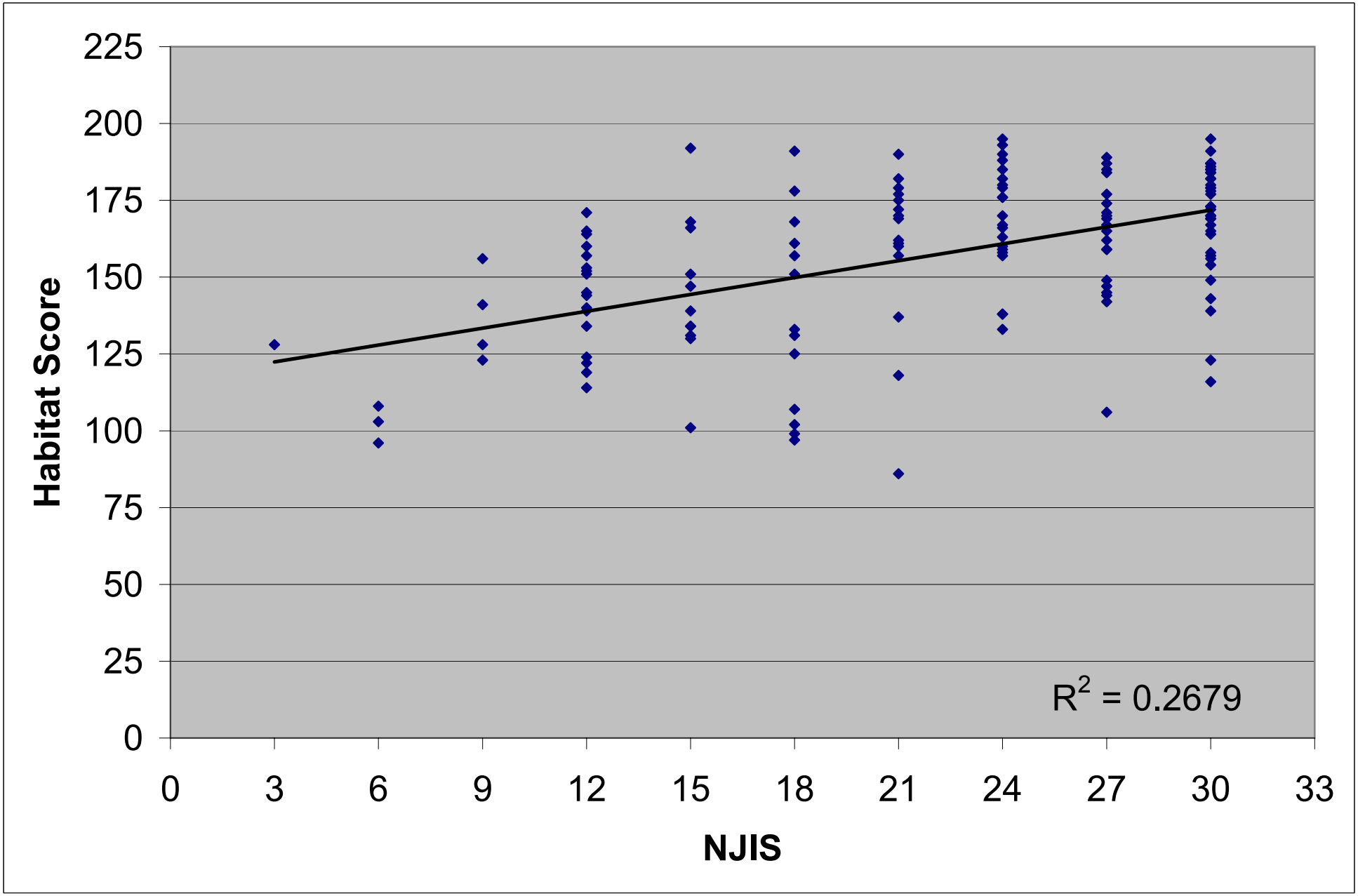
Graphical Comparison of Habitat Assessment Scores and New Jersey Impairment Scores from the Round 3 Upper Delaware Region AMNET Study

Comparative Scores of

HABITAT vs. NJIS

Combined

Rnd 3

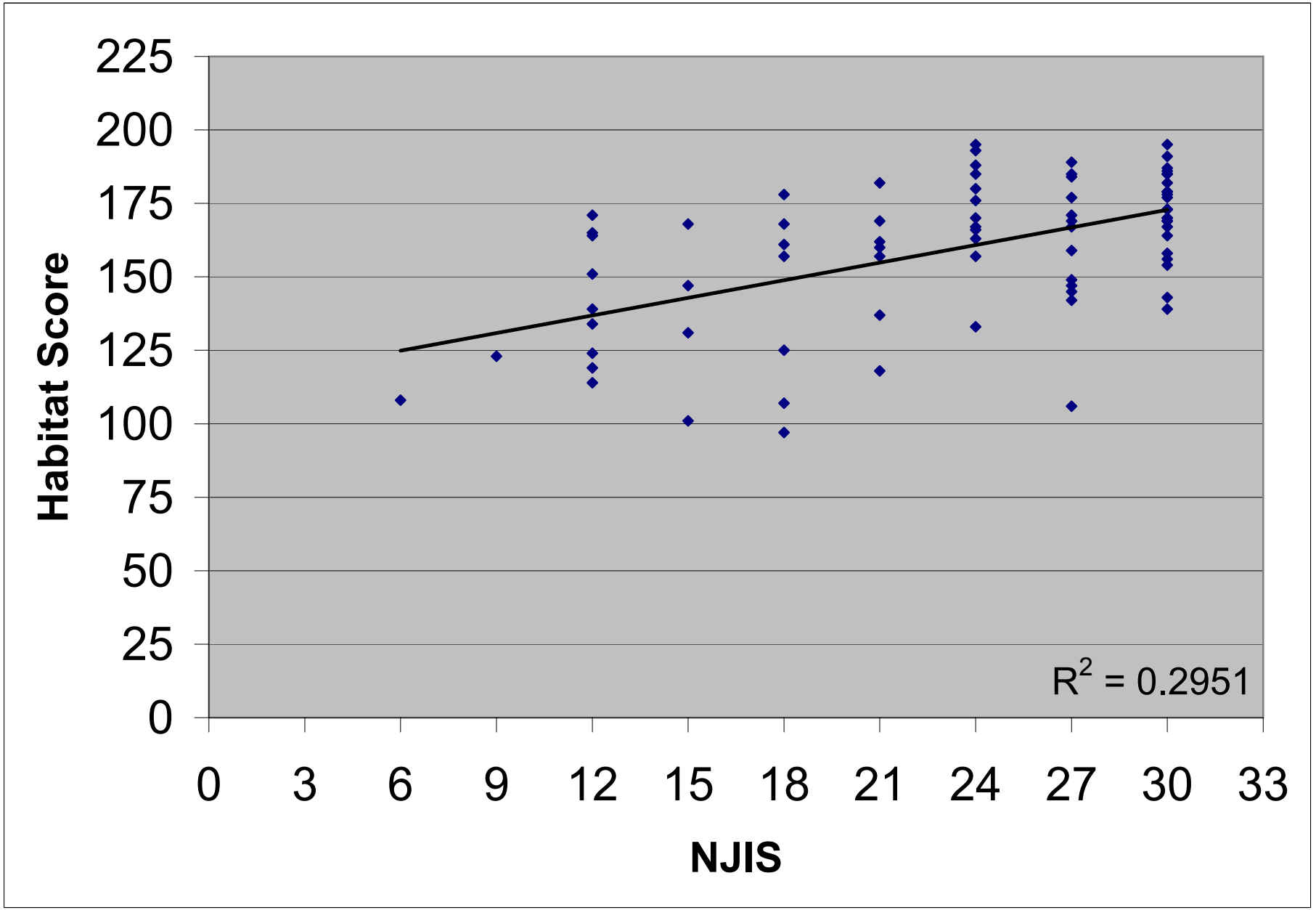


Comparative Scores of

HABITAT vs. NJIS

WMA 1

2003

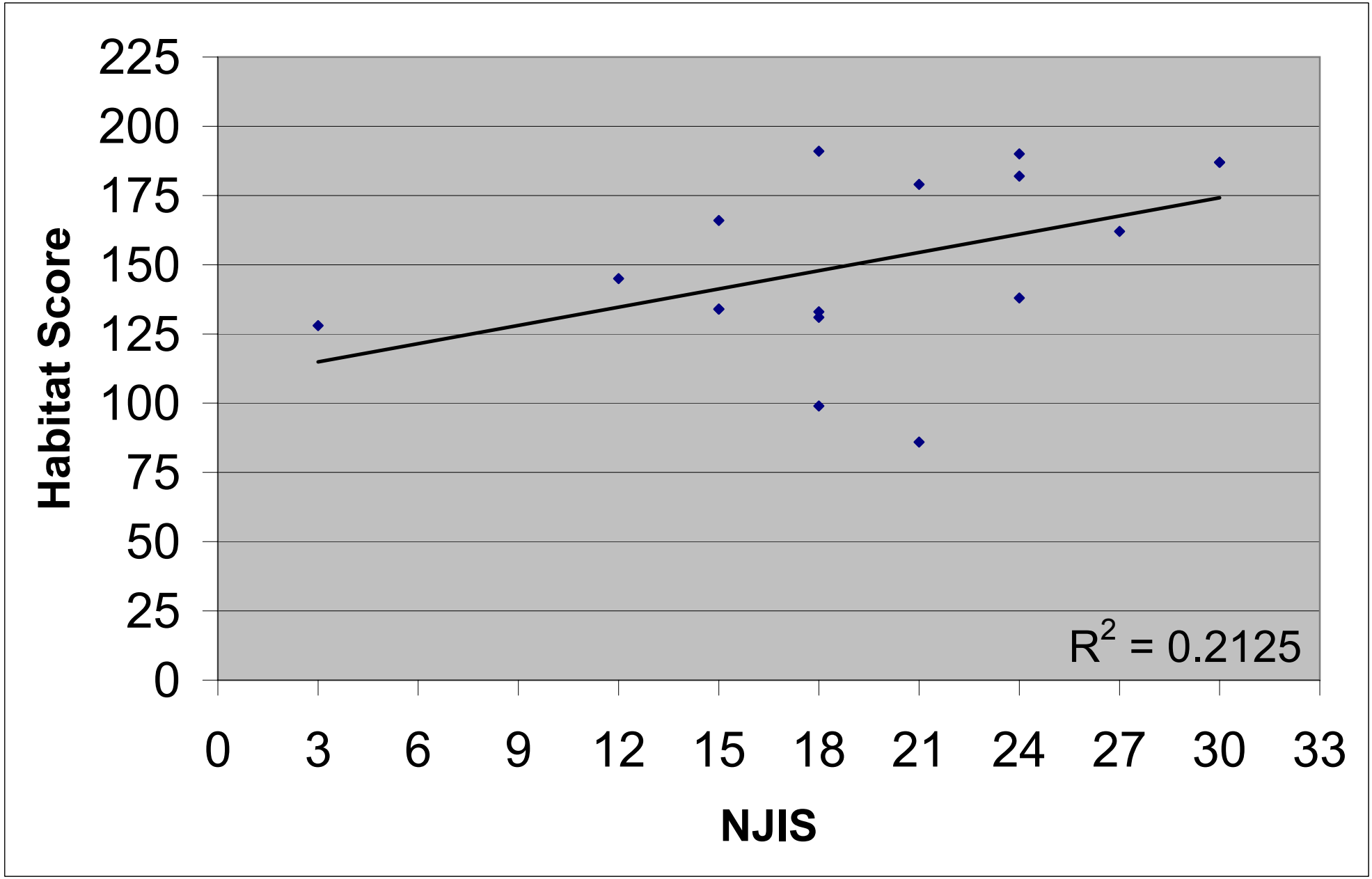


Comparative Scores of

HABITAT vs. NJIS

WMA 2

2003

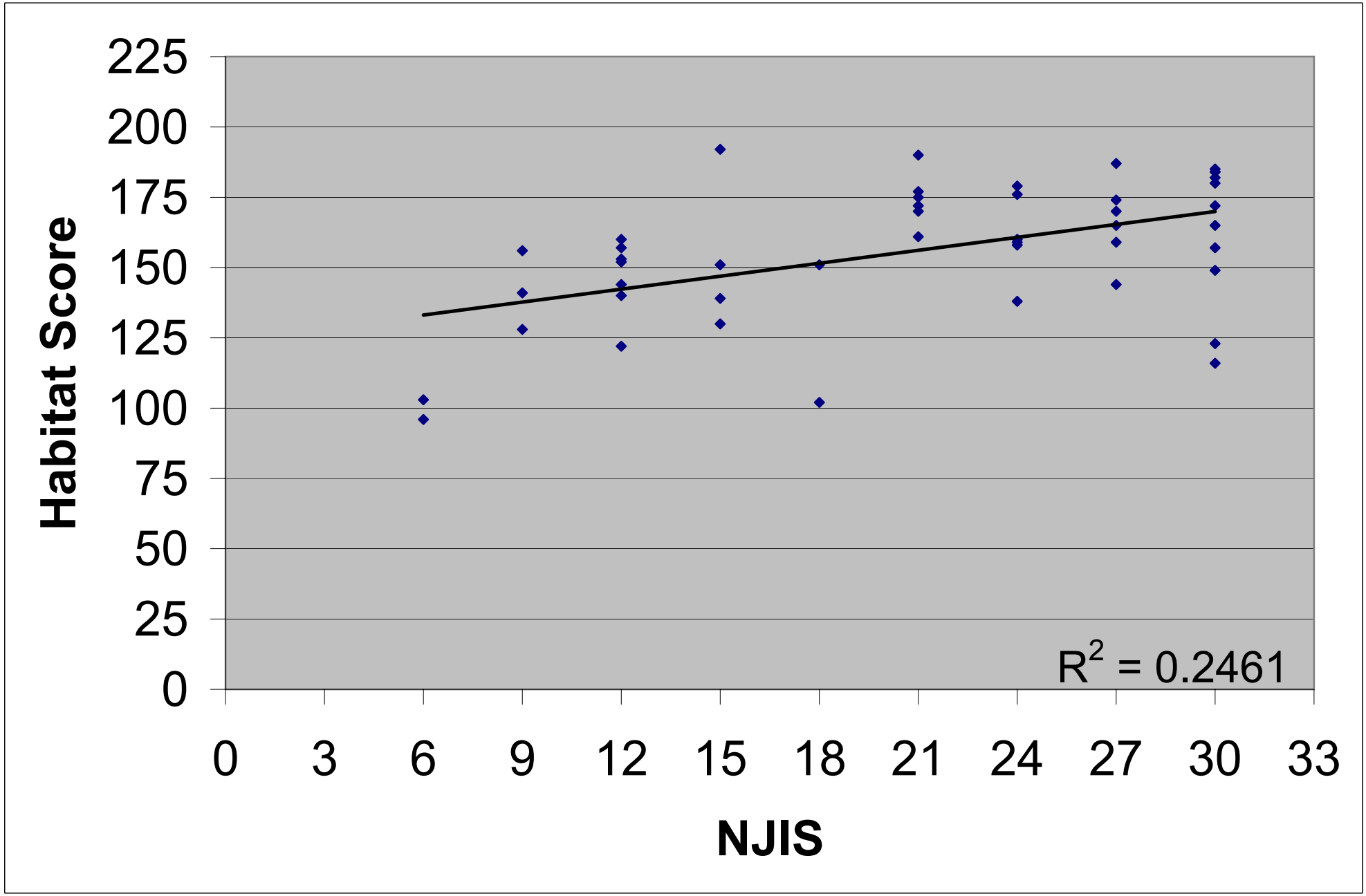


Comparative Scores of

HABITAT vs. NJIS

WMA 11

2003



APPENDIX D

Taxonomic and Statistical Data, NJIS Scores*, Habitat Assessment Scores and Observations from the Round 3 Upper Delaware Region AMNET Study

(Site numbers, locations and USGS topographic quadrangle, top of page.)

Notes/Definitions:

* Statistical data includes those biometric results that are applied to the NJIS rating. Appendix D also includes certain biometrics that have been given as optional for the RBP analysis [2] but are not employed for the NJIS rating [12]; these include ratios of certain functional types or pollution sensitive to pollution tolerant groups; for these (1-3 below), higher values generally indicate better water quality.

1. *Scraper/Filtering Collector Ratio* — dominance of filtering collectors indicates organic enrichment; however, if toxicants are present in the system, their adsorption on macrophytes and fine particulate organics can affect the abundance of filtering collectors.
2. *Shredder/Total Ratio* — considering their diet of coarse particulate organic matter (CPOM), a lack of shredders may indicate the presence of toxicants, particularly from terrestrial sources (e.g. pesticides), as these are readily adsorbed to the CPOM.
3. *EPT/Chironomid Ratio* — even distribution among the major groups, with strong representation in the pollution-sensitive taxa (Ephemeroptera, Plecoptera, Trichoptera), reflects a good biotic condition; dominance of chironomids reflects environmental stress.

Included in the NJIS score are:

1. Taxa Richness – number of families represented in sample.
2. Family Biotic Index – assigns a pollution tolerance level to each family on a scale of zero to ten, zero being least tolerant.
3. Dominant Family – expressed as a percent of total families.
4. Number of EPT families – E + P + T.
5. Percent EPT - % of total families.

See METHODS, Table 1.

Other notes:

1. UNT – un-named tributary
2. Blood Red Chironomidae – primarily members of the tribe Chironomini (subfamily Chironominae), which posses a hemoglobin-like pigment that retains oxygen, thus increasing their tolerance to organic pollution.
3. Habitat observations supplement the habitat assessment scores in Table 2 and Appendix C; Open Canopy = overhead vegetation; water quality measurements taken in field include temperature (°C), pH, dissolved oxygen, conductivity.

APPENDIX D (cont.)
Taxonomic List of Macroinvertebrate Families Found at New Jersey AMNET Sites*

- Phylum PLATYHELMINTHES
  - Class TURBELLARIA (flatworms)
    - Order TRICLADIDA
      - Family Dendrocoelidae
      - Family Planariidae
    - Order MACROSTOMIDA
      - Family Macrostomidae
    - Order NEORHABDOCOELA
      - Family Typhloplanidae
    - Order ALLOEOCOELA
      - Family Plagiostomidae
      - Family Prorhynchidae
- Phylum NEMERTEA (proboscis worms)
  - Class ENOPLA
    - Order HOPLONEMERTINI
      - Family Tetrastemmatidae
- Phylum NEMATODA (roundworms)
- Phylum ANNELIDA
  - Class OLIGOCHAETA (aquatic earthworms)
    - Order HAPLOTAXIDA
      - Family Aeolosomatidae
      - Family Enchytraeidae
      - Family Haplotaxidae
      - Family Lumbricidae
      - Family Naididae
      - Family Tubificidae
    - Order LUMBRICULIDA
      - Family Lumbriculidae
  - Class BRANCHIOBDELLIDA
    - Family Branchiobdellidae
  - Class POLYCHAETA
    - Family Sabellidae
  - Class HIRUDINEA (leeches)
    - Order RHYNCHOBELLIDA
      - Family Glossiphoniidae
      - Family Piscicolidae
    - Order ARHYNCHOBDELLIDA
      - Family Erpobdellidae
    - Order GNATHOBDELLIDA
      - Family Hirudinidae
- Phylum ARTHROPODA
  - Class CRUSTACEA
    - Order ISOPODA (aquatic sow bugs)
      - Family Asellidae
      - Family Oniscidae
      - Family Porcellionidae
    - Order AMPHIPODA (scuds, sideswimmers)
      - Family Gammaridae
      - Family Talitridae
    - Order DECAPODA (crayfish, shrimp)
      - Family Astacidae
      - Family Cambaridae
      - Family Palaemonidae
  - Class ARACHNOIDEA
    - Order HYDRACARINA (water mites)
      - Family Arrenuridae
      - Family Axonopsidae
      - Family Hydryphantidae
      - Family Hygrobatidae
      - Family Lebertiidae
      - Family Limnesiidae
      - Family Pionidae
      - Family Sperchonidae
      - Family Unionicolidae
  - Class CHILOPODA (centipedes)
  - Class DIPLOPODA (millipedes)
  - Class INSECTA
    - Order COLLEMBOLA (springtails)
      - Family Entomobryidae
      - Family Hypogastruridae
      - Family Isotomidae
      - Family Onychiuridae
      - Family Poduridae
    - Order PLECOPTERA (stoneflies)
      - Family Capniidae
      - Family Chloroperlidae
      - Family Leuctridae
      - Family Nemouridae
      - Family Peltoperlidae
      - Family Perlidae
      - Family Perlodidae
      - Family Pteronarcyidae
      - Family Taeniopterygidae
    - Order EPHEMEROPTERA (mayflies)
      - Family Baetidae
      - Family Baetiscidae
      - Family Caenidae
      - Family Ephemerellidae
      - Family Ephemeridae
      - Family Heptageniidae
      - Family Leptophlebiidae
      - Family Metretopodidae
      - Family Oligoneuriidae
      - Family Polymitarcyidae
      - Family Potamanthidae
      - Family Siphlonuridae
      - Family Tricorythidae

* Includes only those taxa that are employed in calculation of the NJIS rating; major taxa are listed in the order presented in Pennak (1978) [17].

- Order ODONATA
  - Suborder ANISOPTERA (dragonflies)
    - Family Aeshnidae
    - Cordulegastridae
    - Corduliidae
    - Gomphidae
    - Libellulidae
    - Macromiidae
  - Suborder ZYGOPTERA (damselflies)
    - Family Calopterygidae
    - Coenagrionidae
    - Lestidae
- Order HEMIPTERA (true bugs)
  - Family Belostomatidae
  - Corixidae
  - Gerridae
  - Mesoveliidae
  - Nepidae
  - Notonectidae
  - Pleidae
  - Veliidae
- Order MEGALOPTERA
  - Family Corydalidae (dobsonflies, fishflies)
  - Sialidae (alderflies)
- Order NEUROPTERA
  - Family Sisyridae (spongilla flies)
- Order TRICHOPTERA (caddisflies)
  - Family Brachycentridae
  - Calamoceratidae
  - Glossosomatidae
  - Helicopsychidae
  - Hydropsychidae
  - Hydroptilidae
  - Lepidostomatidae
  - Leptoceridae
  - Limnephilidae
  - Molannidae
  - Odontoceridae
  - Philopotamidae
  - Phryganeidae
  - Polycentropodidae
  - Psychomyiidae
  - Rhyacophilidae
  - Sericostomatidae
- Order LEPIDOPTERA (aquatic caterpillars)
  - Family Nepticulidae
  - Pyralidae
- Order COLEOPTERA (beetles)
  - Family Chrysomelidae
  - Curculionidae
  - Dryopidae
  - Dytiscidae
  - Elmidae
  - Gyrinidae
  - Haliplidae
  - Hydrophilidae
  - Lampyridae
  - Noteridae
  - Psephenidae
  - Ptilodactylidae
  - Scirtidae
- Order DIPTERA (flies, midges)
  - Family Athericidae
  - Blephariceridae
  - Ceratopogonidae
  - Chaoboridae
  - Chironomidae
  - Culicidae
  - Dixidae
  - Dolichopodidae
  - Empididae
  - Ephydridae
  - Muscidae
  - Phoridae
  - Psychodidae
  - Ptychopteridae
  - Sciomyzidae
  - Simuliidae
  - Stratiomyidae
  - Syrphidae
  - Tabanidae
  - Tanyderidae
  - Tipulidae

- Phylum MOLLUSCA
  - Class GASTROPODA (snails)
    - Order BASOMMATOPHORA
      - Family Ancylidae
      - Lymnaeidae
      - Physidae
      - Planorbidae
    - Order MESOGASTROPODA
      - Family Hydrobiidae
      - Pleuroceridae
      - Valvatidae
      - Viviparidae
  - Class PELECYPODA (clams, mussels)
    - Order EULAMELLIBRANCHIA
      - Family Unionidae
    - Order HETERODONTA
      - Family Corbiculidae
      - Sphaerii

Station: AN0001
Unt To Mill Bk, Outlet Of Lake Marcia Off Rt 23, Montague Twp, Sussex County
Port Jervis South USGS Quadrangle
Date Sampled: 07/02/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Lymnaeidae	6	26
Chironomidae	6	20
Simuliidae	6	14
Leptophlebiidae	2	10
Naididae	7	9
Lumbriculidae	8	6
Dytiscidae	5	4
Physidae	7	3
Tubificidae	10	2
Planorbidae	6	2
Empididae	6	1
Talitridae	8	1
Tabanidae	6	1
Tipulidae	3	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 100
% Contribution of Dominant Family: 26.00 % (Lymnaeidae)
Family Biotic Index: 5.87
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 10.00
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 97 (Marginal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 1.5 ' / < 1'
Substrate: Cobbles....StreamBank Vegetation/Stability: Grasses/Fair
Canopy: Open....Other: Water Temp 23.1C / pH 7.4SU / DO 9.6mg/L / Cond 415umhos; Rural / Forested / Recreational Lake- Hight Point St Pk
Much filamentous algae/ cut grass clumps; Drought emergency

Station: AN0002
Clove Bk, Rt 23, Montague Twp, Sussex County
Port Jervis South USGS Quadrangle
Date Sampled: 07/02/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	12
Heptageniidae	4	12
Tipulidae	3	9
Planorbidae	6	8
Simuliidae	6	7
BloodRed Chironomidae	8	6
Leptoceridae	4	5
Hydropsychidae	4	4
Oligoneuriidae	2	4
Baetidae	4	3
Elmidae	4	3
Aeshnidae	3	2
Veliidae	9	2
Naididae	7	2
Corydalidae	0	2
Philopotamidae	3	1
Talitridae	8	1
Lumbriculidae	8	1
Brachycentridae	1	1
Limnephilidae	4	1
Tetrastemmatidae	7	1
Psephenidae	4	1
Gomphidae	1	1

Statistical Analysis

Number of Taxa: 23
Total Number of Individuals: 89
% Contribution of Dominant Family: 13.48 % (Chironomidae & Heptageniidae)
Family Biotic Index: 4.80
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 34.83
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 177 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 20/1
Substrate: Cobbles/ Gravel/ Sand....StreamBank Vegetation/Stability: Trees/ Grass/ Shrubs/Fair
Canopy: Partly Open....Other: Water Temp 23.8C / pH 7.7SU / DO 7.2mg/L / Cond 281umhos; Suburban (adjacent to gas station and shopping plaza)
Drought emergency / Filamentous algae abundant ;

Station: AN0003
Shimers Bk, Millville Rd, Sussex County
Milford USGS Quadrangle
Date Sampled: 05/22/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	17
Leuctridae	0	12
Psephenidae	4	12
Naididae	7	10
Ephemerellidae	1	8
Baetidae	4	7
Hydropsychidae	4	7
Perlidae	1	5
BloodRed Chironomidae	8	5
Polycentropodidae	6	4
Limnephilidae	4	3
Tetrastemmatidae	7	2
Curculionidae	7	1
Brachycentridae	1	1
Leptoceridae	4	1
Elmidae	4	1
Pteronarcyidae	0	1
Simuliidae	6	1
Sphaeriidae	8	1
Gomphidae	1	1

Statistical Analysis

Number of Taxa: 20
Total Number of Individuals: 100
% Contribution of Dominant Family: 17.00 % (Chironomidae)
Family Biotic Index: 4.10
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 10
% EPT: 49.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 194 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 18.0/<1-1.5
Substrate: Cobbles/ Boulders....StreamBank Vegetation/Stability: Trees/ Shrubs/ Grass/Good
Canopy: Mostly Closed....Other: Water Temp 12.8C / pH 9.4SU / DO 10.8mg/L / Cond 186umhos; Rural/ Forested
Drought Emergency/ Larval fish present;

Station: AN0004
Little Flat Bk, Deckertown Tpk, Montague Twp, Sussex County
Milford USGS Quadrangle
Date Sampled: 05/04/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Ephemerellidae	1	32
Nemouridae	2	12
Leptophlebiidae	2	9
Tipulidae	3	7
Chironomidae	6	5
Gomphidae	1	4
Limnephilidae	4	3
Rhyacophilidae	0	3
Perlidae	1	2
Heptageniidae	4	2
Enchytraeidae	10	2
Chloroperlidae	1	2
Leuctridae	0	2
Corydalidae	0	2
Elmidae	4	2
Sphaeriidae	8	2
Polycentropodidae	6	2
Glossosomatidae	0	1
Cambaridae	5	1
Empididae	6	1
Perlodidae	2	1
Lepidostomatidae	1	1
Ceratopogonidae	6	1
Odontoceridae	0	1

Statistical Analysis

Number of Taxa: 24
Total Number of Individuals: 100
% Contribution of Dominant Family: 32.00 % (Ephemerellidae)
Family Biotic Index: 2.29
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 14
% EPT: 73.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 186 (Optimal) EPA Protocol II
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 8/1
Substrate: Cobbles/ Gravel/ Sand/ Boulder....StreamBank Vegetation/Stability: Trees/Good
Canopy: Closed....Other: Water Temp 10.1C / pH 7.6SU / DO 10.5mg/L / Cond 59umhos;
Rural/ Forested
Drought Emergency/ Recent Rain Event;

Station: AN0005
Little Flat Bk, Rt 656 (Degroat Rd), Sandyston Twp, Sussex County
Milford USGS Quadrangle
Date Sampled: 07/02/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	29
Hydrobiidae	8	16
Hydroptilidae	4	9
Asellidae	8	8
Talitridae	8	6
Tricorythidae	4	6
Baetidae	4	4
Leptoceridae	4	4
BloodRed Chironomidae	8	4
Tetrastemmatidae	7	4
Naididae	7	4
Elmidae	4	3
Helicopsychidae	3	3
Haliplidae	5	2
Heptageniidae	4	2
Coenagrionidae	9	1
Tubificidae	10	1
Lumbriculidae	8	1
Physidae	7	1
Polycentropodidae	6	1

Statistical Analysis

Number of Taxa: 20
Total Number of Individuals: 109
% Contribution of Dominant Family: 26.61 % (Chironomidae)
Family Biotic Index: 6.17
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 26.61
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 185 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 11/2
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees/ Grasses/ Shrubs/Good
Canopy: Partly Open....Other: Water Temp 26.5C / pH 7.7SU / DO 6.5mg/L / Cond 249umhos;
Agriculture- livestock: horses / Macrophytes / Fish
Filamentous Algae / Drought emergency;

Station: AN0005A
Little Flat Bk, Rt 615, Sandyston Twp, Sussex County
Milford USGS Quadrangle
Date Sampled: 07/15/02

Family	Family Tolerance Value (FTV)	Number of Individuals
BloodRed Chironomidae	8	26
Chironomidae	6	26
Hydropsychidae	4	13
Baetidae	4	9
Helicopsychidae	3	8
Tubificidae	10	3
Physidae	7	3
Tricorythidae	4	3
Hydroptilidae	4	2
Corixidae	9	1
Gammaridae	4	1
Gyrinidae	3	1
Ephemerellidae	1	1
Talitridae	8	1
Lepidostomatidae	1	1
Lumbriculidae	8	1
Elmidae	4	1
Heptageniidae	4	1
Leptoceridae	4	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 103
% Contribution of Dominant Family: 25.24 % (BloodRed Chironomidae & Chironomidae)
Family Biotic Index: 5.76
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 9
% EPT: 37.86
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 149 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Slightly Turbid....Flow: Moderate....Width/Depth (ft): 6 ' / 0.5 - 4 '
Substrate: Gravel/ Sand/ Silt....StreamBank Vegetation/Stability: Grasses/ Shrubs/ Trees/Fair
Canopy: Mostly Open....Other: Water Temp 21.4C / pH 8.2SU / DO 7.9mg/L / Cond 460umhos; Rural/ Suburban/ Beaver dam/ Bull frogs/ Salamanders
Crayfish/ Filamentous algae/ Drought emergency;

Station: AN0006
Big Flat Bk, Rt 560, Sandyston Twp, Sussex County
Culvers Gap USGS Quadrangle
Date Sampled: 07/15/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	46
Hydropsychidae	4	6
Hydroptilidae	4	6
Heptageniidae	4	6
Lumbriculidae	8	5
Naididae	7	4
Perlidae	1	3
Baetidae	4	3
Leptoceridae	4	3
Elmidae	4	3
Tipulidae	3	2
Ephemerellidae	1	2
Lepidostomatidae	1	2
Brachycentridae	1	2
Psephenidae	4	2
Caenidae	7	1
Oligoneuriidae	2	1
Lumbricidae	10	1
Corydalidae	0	1
Polycentropodidae	6	1

Statistical Analysis

Number of Taxa: 20
Total Number of Individuals: 100
% Contribution of Dominant Family: 46.00 % (Chironomidae)
Family Biotic Index: 5.00
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 12
% EPT: 36.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 188 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 40 ' / <1.0 - 1.0 '
Substrate: Cobbles / Gravel....StreamBank Vegetation/Stability: Trees / Shrubs / Grass/Good
Canopy: Mostly Open....Other: Water temp 19.7C / pH 8.5SU / DO 8.4mg/L / Cond 112umhos; Rural / Forested / Filamentous algae / Salamanders
Minnows / Drought emergency;

Station: AN0007
Flat Brook, Off Rt 615, Walpack Twp, Sussex County
Lake Maskenozha USGS Quadrangle
Date Sampled: 07/15/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Tubificidae	10	28
BloodRed Chironomidae	8	13
Asellidae	8	11
Gammaridae	4	8
Chironomidae	6	8
Lumbriculidae	8	7
Baetidae	4	5
Hydropsychidae	4	4
Dytiscidae	5	3
Sphaeriidae	8	3
Ephemerellidae	1	3
Elmidae	4	3
Perlidae	1	1
Planariidae	4	1
Gyrinidae	3	1
Gomphidae	1	1
Hydroptilidae	4	1
Oligoneuriidae	2	1
Polycentropodidae	6	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 103
% Contribution of Dominant Family: 27.18 % (Tubificidae)
Family Biotic Index: 6.98
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 15.53
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 180 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 54/<1-1.0
Substrate: Cobbles/ Gravel/ Sand....StreamBank Vegetation/Stability: Trees/ Grass/ Shrubs/Good
Canopy: Mostly Open....Other: Water Temp 21.2 C / pH 8.6 SU / DO 10.9 mg/L / Cond 300 umhos; Rural / Forested / Minnows & Darters present
Filamentous Algae present / Drought emergency;

Station: AN0008
Flat Bk, Adjacent To Rt. 615, Walpack Twp., Sussex County
Flatbrookville USGS Quadrangle
Date Sampled: 4/11/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Ephemerellidae	1	41
Lumbriculidae	8	14
Helicopsychidae	3	7
Chironomidae	6	5
Heptageniidae	4	5
Perlidae	1	4
Lepidostomatidae	1	4
Hydropsychidae	4	3
Oligoneuriidae	2	3
Tetrastemmatidae	7	3
Planorbidae	6	2
Planariidae	4	2
Elmidae	4	2
Tipulidae	3	1
Gomphidae	1	1
Perlodidae	2	1
Polycentropodidae	6	1
Rhyacophilidae	0	1

Statistical Analysis

Number of Taxa: 18
Total Number of Individuals: 100
% Contribution of Dominant Family: 41.00 % (Ephemerellidae)
Family Biotic Index: 3.11
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 10
% EPT: 70.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 185 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 30/<1-1.5
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs, grass/Stable
Canopy: Mostly Open....Other: rural, forested; drought emergency
some periphyton; Water temp. 12.6C / pH 7.9SU / DO 10.6mg/L / Cond. 170umhos

Station: AN0009
Van Campens Brook, Flatbrookville - Middleville Rd, Wallpack Twp., Sussex County
Flatbrookville USGS Quadrangle
Date Sampled: 06/12/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Nemouridae	2	53
Leuctridae	0	18
Simuliidae	6	10
Naididae	7	9
Chironomidae	6	4
Perlodidae	2	2
Perlidae	1	1
Enchytraeidae	10	1
Lepidostomatidae	1	1
Rhyacophilidae	0	1

Statistical Analysis

Number of Taxa: 10
Total Number of Individuals: 100
% Contribution of Dominant Family: 53.00 % (Nemouridae)
Family Biotic Index: 2.69
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 76.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 195 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 10 ' / < 1.0 - 1.5 '
Substrate: Cobbles, boulders, snags....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Partly Open....Other: Water temp. 14.6 C /pH 5.7 SU /DO 9.3 mg/L /Cond 39 umhos; Rural / forested
Stream channelized under roadway via pipes.; Site dry on 7/15/02

Station: AN0010
Van Campens Bk, Mill Rd, Hardwick Twp, Warren County
Flatbrookville USGS Quadrangle
Date Sampled: 07/16/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Heptageniidae	4	16
Simuliidae	6	12
Baetidae	4	11
BloodRed Chironomidae	8	7
Peltoperlidae	1	7
Chironomidae	6	7
Hydropsychidae	4	5
Ephemerellidae	1	5
Leuctridae	0	5
Elmidae	4	5
Perlidae	1	4
Philopotamidae	3	4
Tipulidae	3	3
Rhyacophilidae	0	2
Psephenidae	4	1
Chloroperlidae	1	1
Oligoneuriidae	2	1
Lepidostomatidae	1	1
Leptophlebiidae	2	1
Polycentropodidae	6	1
Pteronarcyidae	0	1

Statistical Analysis

Number of Taxa: 21
Total Number of Individuals: 100
% Contribution of Dominant Family: 16.00 % (Heptageniidae)
Family Biotic Index: 3.71
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 15
% EPT: 65.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 169 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 12/<1
Substrate: Cobbles/ Gravel/ Sand....StreamBank Vegetation/Stability: Grasses/ Trees/Stable
Canopy: Mostly Closed....Other: Water Temp 16.8C / pH 8.3SU / DO 9.0mg/L / Cond 64umhos; Rural/ Forested- Millbrook Village, Delaware Water Gap
Nat. Rec. Area/ Drought emergency;

Station: AN0011
Van Campens Brook, Old Mine Road, Hardwick Twp, Warren/ Sussex County
Bushkill USGS Quadrangle
Date Sampled: 04/11/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Heptageniidae	4	30
Ephemerellidae	1	18
Baetidae	4	17
Leptophlebiidae	2	13
Chloroperlidae	1	9
Perlidae	1	2
Hydropsychidae	4	2
BloodRed Chironomidae	8	2
Tipulidae	3	1
Lumbriculidae	8	1
Chironomidae	6	1
Nemouridae	2	1
Polycentropodidae	6	1
Elmidae	4	1
Psephenidae	4	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 30.00 % (Heptageniidae)
Family Biotic Index: 3.00
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 9
% EPT: 93.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 185 (Optimal) EPA Protocol II
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 40/ <1-1
Substrate: Cobbles/ Gravel/ Snags....StreamBank Vegetation/Stability: Trees/ Shrubs/ Grass/Good
Canopy: Partly Open....Other: Water Temp 8.8C / pH 8.4SU / DO 11.1mg/L / Cond 70umhos; Forested- Delaware Water Gap Recreation Area
Drought emergency; Salamanders and turtles present

Station: AN0012
Dunnfield Ck, Off Of I-80, Hardwick Twp, Warren County
Stroudsburg USGS Quadrangle
Date Sampled: 06/11/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Glossosomatidae	0	20
Baetidae	4	11
Ephemerellidae	1	9
Chironomidae	6	8
Heptageniidae	4	8
Lumbriculidae	8	7
Leptophlebiidae	2	7
Planariidae	4	5
Hydropsychidae	4	3
Lepidostomatidae	1	3
Tetrastemmatidae	7	3
Naididae	7	3
Perlodidae	2	2
Lumbricidae	10	2
Elmidae	4	2
Tipulidae	3	2
Philopotamidae	3	1
Gammaridae	4	1
Gomphidae	1	1
Polycentropodidae	6	1
Pteronarcyidae	0	1

Statistical Analysis

Number of Taxa: 21
Total Number of Individuals: 100
% Contribution of Dominant Family: 20.00 % (Glossosomatidae)
Family Biotic Index: 3.32
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 11
% EPT: 66.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 179 (Optimal) USEPA Protocol II
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 11/<1
Substrate: Cobbles/ Gravel/ Sand....StreamBank Vegetation/Stability: Trees/ Shrubs/Good
Canopy: Mostly Closed....Other: Water Temp 14.6C / pH 7.5SU / DO 10.1mg/L / Cond 32umhos; Forested- Delaware Water Gap park
Drought emergency;

Station: AN0013
Stony Brook, Stark Rd, Knowlton Twp, Warren County
Portland USGS Quadrangle
Date Sampled: 06/12/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Baetidae	4	36
Heptageniidae	4	17
Ephemerellidae	1	12
Nemouridae	2	9
Leptophlebiidae	2	8
Lumbricidae	10	6
Lepidostomatidae	1	4
Gomphidae	1	1
Simuliidae	6	1
Hydropsychidae	4	1
Corydalidae	0	1
Perlidae	1	1
Tetrastemmatidae	7	1
Psephenidae	4	1
Chironomidae	6	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 36.00 % (Baetidae)
Family Biotic Index: 3.51
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 88.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 191 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 15 ' / < 1.0 - 1 '
Substrate: Cobbles, boulders....StreamBank Vegetation/Stability: Shrubs, trees, grass/Good
Canopy: Partly Open....Other: Water temp. 15.1 C /pH 6.8 SU /DO 9.8 mg/L /Cond 52 umhos; Rural

Station: AN0014
Unt To Paulins Kill, Rt 623, Lafayette Twp, Sussex County
Newton East USGS Quadrangle
Date Sampled: 09/24/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	54
Simuliidae	6	27
Baetidae	4	6
Hydrobiidae	8	3
Hydropsychidae	4	3
Brachycentridae	1	2
Calopterygidae	5	2
Elmidae	4	1
Ancylidae	6	1
Chironomidae	6	1

Statistical Analysis

Number of Taxa: 10
Total Number of Individuals: 100
% Contribution of Dominant Family: 54.00 % (Gammaridae)
Family Biotic Index: 4.66
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 11.00
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 161 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Slightly Turbid....Flow: Moderate....Width/Depth (ft): 4.0 ' / 1.5 - 2.5 '
Substrate: Cobbles / Gravel / Sand / Silt....StreamBank Vegetation/Stability: Trees / Grass /Good
Canopy: Partly Open....Other: Water temp 16.7C / pH 7.1SU / DO 5.4mg/L / Cond 781umhos; Agriculture- cropland / Rural / Periphyton / Macrophytes abundant / Drought emergency;

Station: AN0015
Paulins Kill, Route 663, Lafayette Twp, Sussex County
Newton East USGS Quadrangle
Date Sampled: 05/15/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	42
Tubificidae	10	18
Chironomidae	6	13
Coenagrionidae	9	8
Asellidae	8	6
Elmidae	4	6
BloodRed Chironomidae	8	3
Planariidae	4	2
Planorbidae	6	2
Haliplidae	5	2
Hydrobiidae	8	1
Caenidae	7	1
Viviparidae	6	1
Empididae	6	1
Limnephilidae	4	1
Naididae	7	1
Physidae	7	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 109
% Contribution of Dominant Family: 38.53 % (Gammaridae)
Family Biotic Index: 6.14
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 1.83
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 147 (Suboptimal) EPA Protocol II
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Turbid....Flow: Moderate....Width/Depth (ft): 30/ 2-3
Substrate: Gravel/ Sand/ Silt....StreamBank Vegetation/Stability: Trees/ Shrubs/Fair
Canopy: Mostly Open....Other: Water Temp 10.6C / pH 8.8SU / DO 9.0mg/L / Cond 561umhos; Agriculture- livestock/ Rural
Storm Sewers/ Rain Recently/ Drought Emergency;

Station: AN0016
Unt To Paulins Kill, Meadows Road, Lafayette Twp, Sussex County
Newton East USGS Quadrangle
Date Sampled: 05/15/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	26
Asellidae	8	25
Chironomidae	6	19
Elmidae	4	11
Tubificidae	10	7
Physidae	7	4
BloodRed Chironomidae	8	3
Sphaeriidae	8	2
Psephenidae	4	2
Naididae	7	1

Statistical Analysis

Number of Taxa: 10
Total Number of Individuals: 100
% Contribution of Dominant Family: 26.00 % (Gammaridae)
Family Biotic Index: 6.15
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 0
% EPT: 0.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 134 (Suboptimal) EPA Protocol II
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 11/ <1
Substrate: Cobbles/ Gravel/ Sand....StreamBank Vegetation/Stability: Grasses/ Trees/Poor
Canopy: Mostly Open....Other: Water Temp 10.9C / pH 8.6SU / DO 10.7mg/L / Cond 399umhos;
Agriculture- livestock, horses/ Rural
Drought Emergency; Recent Rain Event

Station: AN0017
Culvers Ck, Rt 206, Frankford Twp, Sussex County
Culvers Gap USGS Quadrangle
Date Sampled: 07/30/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Asellidae	8	38
Tubificidae	10	24
Plagiostomidae	4	11
Hydropsychidae	4	5
BloodRed Chironomidae	8	5
Elmidae	4	5
Sphaeriidae	8	4
Ancylidae	6	2
Chironomidae	6	2
Dytiscidae	5	1
Aeshnidae	3	1
Gammaridae	4	1
Empididae	6	1
Lumbriculidae	8	1
Naididae	7	1
Tetrastemmatidae	7	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 103
% Contribution of Dominant Family: 36.89 % (Asellidae)
Family Biotic Index: 7.42
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 4.85
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 119 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 6.0/1.0
Substrate: Cobbles / Gravel....StreamBank Vegetation/Stability: Weeds / Trees/Fair
Canopy: Open....Other: Water temp 23.1C / pH 7.6SU / DO 4.8mg/L / Cond 172umhos;
Suburban / Macrophytes / Drought emergency
Inlet to Culvers Lake/ outlet Oswego Lake appr 1 mi up;

Station: AN0018
Culvers Ck, Long Bridge Rd, Frankford Twp, Sussex County
Culvers Gap USGS Quadrangle
Date Sampled: 07/30/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Asellidae	8	25
Physidae	7	17
Lumbriculidae	8	13
BloodRed Chironomidae	8	11
Talitridae	8	9
Plagiostomidae	4	7
Tubificidae	10	6
Chironomidae	6	5
Gammaridae	4	4
Hydrobiidae	8	1
Planariidae	4	1
Sphaeriidae	8	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 25.00 % (Asellidae)
Family Biotic Index: 7.37
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 0
% EPT: 0.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 165 (Optimal) USEPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 9.0/1.0
Substrate: Cobbles / Gravel ....StreamBank Vegetation/Stability: Trees / Shrubs/Good
Canopy: Mostly Closed....Other: Water temp 23.8C / pH 7.8SU / DO 4.1mg/L / Cond 258umhos; Rural / Forested / Culvers Lake upstream
Drought emergency / Trout stocked;

Station: AN0019
Dry Bk, Rt 519, Frankford Twp, Sussex County
Branchville USGS Quadrangle
Date Sampled: 07/30/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	19
Planorbidae	6	18
Tubificidae	10	17
Sphaeriidae	8	11
Sialidae	4	9
Baetidae	4	6
Ancylidae	6	5
Corixidae	9	4
Tetrastemmatidae	7	4
Talitridae	8	3
Elmidae	4	2
Physidae	7	2
Aeshnidae	3	1
BloodRed Chironomidae	8	1
Leptoceridae	4	1
Naididae	7	1
Polycentropodidae	6	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 105
% Contribution of Dominant Family: 18.10 % (Chironomidae)
Family Biotic Index: 6.74
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 7.62
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 107 (Marginal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 10.0/ <1
Substrate: Gravel / Sand....StreamBank Vegetation/Stability: Trees / Grass/Fair
Canopy: Partly Open....Other: Water temp 23.7C / pH 7.5SU / DO 6.8mg/L / Cond 315umhos;
Agriculture- livestock / Forested / Algae / Fish / Frogs
Flow- still / Farm downstream / Water cloudy / Drought emergency;

Station: AN0020
Dry Brook, Mill Rd, Branchville Boro, Sussex County
Branchville USGS Quadrangle
Date Sampled: 06/12/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Baetidae	4	26
Chironomidae	6	13
Enchytraeidae	10	12
Glossosomatidae	0	11
Leptophlebiidae	2	8
Perlidae	1	8
Lumbricidae	10	3
BloodRed Chironomidae	8	3
Hydropsychidae	4	2
Gammaridae	4	2
Philopotamidae	3	1
Curculionidae	7	1
Ephemerellidae	1	1
Naididae	7	1
Tipulidae	3	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 93
% Contribution of Dominant Family: 27.96 % (Baetidae)
Family Biotic Index: 4.48
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 61.29
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 185 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 25 ' / 1 - 4 '
Substrate: Cobbles, boulders, gravel/sand, snags....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Partly Open....Other: Water temp. 18.0 C /pH 7.8 SU /DO 9.4 mg/L /Cond 247 umhos; Suburban. Storm sewers
Construction of house ~ 50 yds downstream - dirt piles; Dry on previous visit on 7/30/02

Station: AN0021
Paulins Kill, Rt 626, Hampton Twp, Sussex County
Newton West USGS Quadrangle
Date Sampled: 9/24/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Elmidae	4	27
Planariidae	4	14
Hydropsychidae	4	10
Philopotamidae	3	10
Sphaeriidae	8	10
Ephemerellidae	1	7
Chironomidae	6	5
Baetidae	4	4
Psephenidae	4	3
Heptageniidae	4	3
Leptoceridae	4	2
Coenagrionidae	9	1
Helicopsychidae	3	1
Oligoneuriidae	2	1
Tubificidae	10	1
Simuliidae	6	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 100
% Contribution of Dominant Family: 27.00 % (Elmidae)
Family Biotic Index: 4.29
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 38.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 187 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 40 ' / 1.5 '
Substrate: Cobbles, gravel....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Partly Open....Other: Water temp 19.1 C / pH 7.9 SU / DO 8.9 mg/L / Cond 690 umhos; Rural. Creosote wet on bridge, old bridge/dam footprint
macrophytes, crayfish; Drought emergency

Station: AN0022
Paulins Kill, Rt 614 Outlet To Paulins Kill Lake, Stillwater Twp, Sussex County
Newton West USGS Quadrangle
Date Sampled: 08/06/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	68
BloodRed Chironomidae	8	14
Planariidae	4	6
Philopotamidae	3	2
Tubificidae	10	2
Simuliidae	6	2
Sphaeriidae	8	2
Baetidae	4	1
Ancylidae	6	1
Pyralidae	5	1
Physidae	7	1

Statistical Analysis

Number of Taxa: 11
Total Number of Individuals: 100
% Contribution of Dominant Family: 68.00 % (Hydropsychidae)
Family Biotic Index: 4.84
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 71.00
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 162 (Optimal) USEPA Protocol
Deficiency(s) noted: Hydropsychidae Family Overwhelmingly Dominant -
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 133.5/ <1.0-1.5
Substrate: Cobbles / Gravel / Sand....StreamBank Vegetation/Stability: Trees / Shrubs / Grass/Fair
Canopy: Partly Open....Other: Water temp 27.5 C / pH 7.8 SU / DO 6.7 mg/L / Cond 642 umhos; Rural / Dam / Lake outlet / Drought emergency

Station: AN0023
Troy Bk, Outlet Of Swartswood Lk, Stillwater Twp, Sussex County
Newton West USGS Quadrangle
Date Sampled: 08/06/02

Family	Family Tolerance Value (FTV)	Number of Individuals
BloodRed Chironomidae	8	41
Chironomidae	6	24
Planariidae	4	7
Simuliidae	6	7
Tubificidae	10	5
Elmidae	4	5
Tetrastemmatidae	7	4
Naididae	7	3
Hydrophilidae	5	1
Brachycentridae	1	1
Empididae	6	1
Physidae	7	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 41.00 % (BloodRed Chironomidae)
Family Biotic Index: 6.80
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 1.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 171 (Optimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 15.0 ' / < 1.0 - 1.0 '
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees / Shrubs / Grass/Fair
Canopy: Mostly Closed....Other: Water temp 26.8 C / pH 8.0 SU / DO 5.3 mg/L / Cond 231 umhos; Rural / Forested- Swartswood Park / Dam / Lake outlet
Filamentous Algae / Drought emergency;

Station: AN0023A
Troy Bk, Swartswood Rd (Upstream Of Swartswood Lake), Stillwater Twp, Sussex County
Newton East USGS Quadrangle
Date Sampled: 08/06/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Tetrastemmatidae	7	18
Chironomidae	6	15
Elmidae	4	9
BloodRed Chironomidae	8	8
Hydropsychidae	4	7
Perlidae	1	6
Aeshnidae	3	5
Tipulidae	3	4
Philopotamidae	3	4
Baetidae	4	3
Lumbricidae	10	3
Physidae	7	3
Calopterygidae	5	2
Leptoceridae	4	2
Glossosomatidae	0	2
Lumbriculidae	8	2
Planariidae	4	2
Sphaeriidae	8	2
Lymnaeidae	6	1
Gomphidae	1	1
Empididae	6	1
Hydroptilidae	4	1
Corydalidae	0	1
Psephenidae	4	1
Naididae	7	1
Heptageniidae	4	1
Peltoperlidae	1	1
Tricorythidae	4	1

Statistical Analysis

Number of Taxa: 28
Total Number of Individuals: 107
% Contribution of Dominant Family: 16.82 % (Tetrastemmatidae)
Family Biotic Index: 5.11
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 10
% EPT: 26.17
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 170 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 18.5 ' / < 1.0 '
Substrate: Cobbles / Gravel....StreamBank Vegetation/Stability: Trees / Shrubs/Good
Canopy: Partly Open....Other: Water temp 20.2 C / pH 9.0 SU / DO 9.3 mg/L / Cond 190 umhos; Rural / Storm sewers / Periphyton / Drought emergency

Station: AN0024
Trout Bk, Rt 612 & 521, Stillwater Twp, Sussex County
Newton West USGS Quadrangle
Date Sampled: 08/06/02

Family	Family Tolerance Value (FTV)	Number of Individuals
BloodRed Chironomidae	8	20
Lepidostomatidae	1	10
Psephenidae	4	9
Chironomidae	6	7
Hydropsychidae	4	6
Helicopsychidae	3	5
Gomphidae	1	5
Tubificidae	10	4
Sphaeriidae	8	4
Elmidae	4	4
Peltoperlidae	1	4
Perlidae	1	3
Caenidae	7	3
Odontoceridae	0	3
Heptageniidae	4	3
Aeshnidae	3	2
Tetrastemmatidae	7	2
Leptoceridae	4	2
Ephemerellidae	1	1
Chloroperlidae	1	1
Empididae	6	1
Tipulidae	3	1
Leuctridae	0	1
Lumbriculidae	8	1
Psychomyiidae	2	1
Veliidae	9	1
Simuliidae	6	1

Statistical Analysis

Number of Taxa: 27
Total Number of Individuals: 105
% Contribution of Dominant Family: 19.05 % (BloodRed Chironomidae)
Family Biotic Index: 4.61
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 13
% EPT: 40.95
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 178 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 15.0 ' / 4 '
Substrate: Cobbles / Gravel....StreamBank Vegetation/Stability: Trees / Shrubs/Good
Canopy: Partly Open....Other: Water temp 20.2 C / pH 7.7 SU / DO 8.3 mg/L / Cond 188 umhos; Agriculture- cropland / Rural / Drought emergency

Station: AN0025
Paulins Kill, Off Sunset Hill Rd (Usgs Gauge), Blairstown Twp, Warren County
Blairstown USGS Quadrangle
Date Sampled: 08/08/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydrobiidae	8	58
Elmidae	4	10
Gammaridae	4	8
Sphaeriidae	8	7
Pleuroceridae	6	6
Glossosomatidae	0	4
Baetidae	4	2
Hydropsychidae	4	1
Planariidae	4	1
Planorbidae	6	1
Lumbriculidae	8	1
Physidae	7	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 58.00 % (Hydrobiidae)
Family Biotic Index: 6.65
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 7.00
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 168 (Optimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 80 ' / < 1.0 - 1.5 '
Substrate: Cobbles/ Gravel ....StreamBank Vegetation/Stability: Trees / Shrubs / Grass/Good
Canopy: Mostly Open....Other: Water temp 21.7C / pH 8.0SU / DO 8.1mg/L / Cond 552umhos; Suburban / Rural / Weir for USGS Gauge/ Fish
Periphyton / Filamentous Algae / Drought emergency;

Station: AN0026
Blair Ck, Shannon Rd, Hardwick Twp, Warren County
Flatbrookville USGS Quadrangle
Date Sampled: 9/24/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	35
Tetrastemmatidae	7	19
Sphaeriidae	8	9
Philopotamidae	3	6
Hydropsychidae	4	4
Planariidae	4	4
Baetidae	4	3
Tubificidae	10	2
Oligoneuriidae	2	2
Lumbriculidae	8	2
Hydroptilidae	4	2
Calopterygidae	5	1
Simuliidae	6	1
Gyrinidae	3	1
Ancylidae	6	1
Glossosomatidae	0	1
Brachycentridae	1	1
Corydalidae	0	1
Elmidae	4	1
Haliplidae	5	1
Physidae	7	1
BloodRed Chironomidae	8	1
Sialidae	4	1

Statistical Analysis

Number of Taxa: 23
Total Number of Individuals: 100
% Contribution of Dominant Family: 35.00 % (Chironomidae)
Family Biotic Index: 5.74
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 19.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 157 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 12 / 1.5
Substrate: Cobbles....StreamBank Vegetation/Stability: Shrubs, grass/Good
Canopy: Partly Open....Other: Water temp 19.2 C / pH 8.9 SU / DO 10.0 mg/L / Cond 148 umhos; Ag-cropland, rural. New gravel on road
Periphyton, macrophytes, filamentous algae, frogs, fish; Drought emergency

Station: AN0027
Blair Ck, Rt 94, Blairstown Twp, Warren County
Blairestown USGS Quadrangle
Date Sampled: 08/08/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Elmidae	4	32
Gammaridae	4	23
Psephenidae	4	9
Sphaeriidae	8	5
Hydropsychidae	4	4
Ancylidae	6	3
Oligoneuriidae	2	3
Ephemerellidae	1	3
Heptageniidae	4	3
Philopotamidae	3	2
Planorbidae	6	2
Valvatidae	4	2
Sericostomatidae	3	1
Limnephilidae	4	1
Coenagrionidae	9	1
Baetidae	4	1
Chironomidae	6	1
Lepidostomatidae	1	1
Lumbriculidae	8	1
Leptoceridae	4	1
Physidae	7	1

Statistical Analysis

Number of Taxa: 21
Total Number of Individuals: 100
% Contribution of Dominant Family: 32.00 % (Elmidae)
Family Biotic Index: 4.23
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 10
% EPT: 20.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 142 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 53 ' / < 1 '
Substrate: Cobbles / gravel / sand....StreamBank Vegetation/Stability: Grass / Trees / Shrubs/Fair
Canopy: Partly Open....Other: Water temp 21.7 C / pH 8.5 SU / DO 7.2 mg/L / Cond 359 umhos; Suburban / Periphyton / Filamentous algae / Drought emergency
Park on the opposite side of bridge;

Station: AN0028
Jacksonburg Ck, Rt 602, Hardwick Twp., Warren & Sussex County
Flatbrookville USGS Quadrangle
Date Sampled: 4/9/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Simuliidae	6	48
Ephemerellidae	1	17
Chironomidae	6	15
Sphaeriidae	8	6
Naididae	7	4
Elmidae	4	3
Perlidae	1	1
Nemouridae	2	1
Leptoceridae	4	1
Leptophlebiidae	2	1
Odontoceridae	0	1
Limnephilidae	4	1
Gomphidae	1	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 100
% Contribution of Dominant Family: 48.00 % (Simuliidae)
Family Biotic Index: 4.97
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 23.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 163 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 11/1
Substrate: Cobble, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs, grass/Stable
Canopy: Mostly Open....Other: rural, forested; drought emergency macrophytes; Water temp. 12.1C / pH 8.5SU / DO NA / Cond. 68umhos

Station: AN0029
Jacksonburg Ck, Rt 94, Blairstown Twp, Warren County
Blairstown USGS Quadrangle
Date Sampled: 08/08/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Ancylidae	6	16
Heptageniidae	4	13
Limnephilidae	4	13
Psephenidae	4	10
Hydropsychidae	4	9
Leuctridae	0	6
Elmidae	4	6
Baetidae	4	5
Oligoneuriidae	2	5
Lumbricidae	10	4
Perlidae	1	3
Ephemerellidae	1	2
Tipulidae	3	1
Caenidae	7	1
Glossosomatidae	0	1
Planorbidae	6	1
Lepidostomatidae	1	1
Gomphidae	1	1
Chironomidae	6	1
Tetrastemmatidae	7	1

Statistical Analysis

Number of Taxa: 20
Total Number of Individuals: 100
% Contribution of Dominant Family: 16.00 % (Ancylidae)
Family Biotic Index: 4.06
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 11
% EPT: 59.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 154 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 10 ' / < 1.0 '
Substrate: Cobbles / gravel /sand....StreamBank Vegetation/Stability: Shrubs / Trees / Grass/Good
Canopy: Mostly Closed....Other: Water temp 20.2C / pH 8.6SU / DO 8.2mg/L / Cond 172umhos; Suburban / Fish / Periphyton / Drought emergency

Station: AN0030
Yards Ck, Mt. Vernon Rd, Blairstown Twp, Warren County
Portland USGS Quadrangle
Date Sampled: 07/25/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	27
Talitridae	8	17
Caenidae	7	13
BloodRed Chironomidae	8	13
Naididae	7	10
Leptoceridae	4	5
Coenagrionidae	9	4
Hydrobiidae	8	3
Sphaeriidae	8	3
Tubificidae	10	1
Elmidae	4	1
Planorbidae	6	1
Glossiphoniidae	8	1
Polycentropodidae	6	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 100
% Contribution of Dominant Family: 27.00 % (Chironomidae)
Family Biotic Index: 7.01
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 19.00
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 125 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution -

Observations

Streamwater: Slightly Turbid....Flow: Slow....Width/Depth (ft): 12.5 ' / 1.0 - 3.0 '
Substrate: Gravel / Sand / Mud / Silt....StreamBank Vegetation/Stability: Shrubs / Grass / Trees/Fair
Canopy: Open....Other: Water temp 26.2 C / pH 8.7 SU / DO 6.9 mg/L / Cond 94 umhos; Rural / Fish / Macrophytes / Much Periphyton / Frogs
3 small beaver dams / Drought emergency;

Station: AN0031
Yards Ck, Rt 94, Knowlton Twp, Warren County
Portland USGS Quadrangle
Date Sampled: 07/25/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Elmidae	4	24
Heptageniidae	4	18
Psephenidae	4	8
Hydropsychidae	4	5
Caenidae	7	4
Chironomidae	6	4
Gammaridae	4	4
Leuctridae	0	4
BloodRed Chironomidae	8	4
Empididae	6	3
Tubificidae	10	3
Baetidae	4	2
Perlidae	1	2
Tipulidae	3	2
Helicopsychidae	3	2
Brachycentridae	1	2
Naididae	7	2
Asellidae	8	1
Glossosomatidae	0	1
Oligoneuriidae	2	1
Lumbriculidae	8	1
Leptoceridae	4	1
Leptophlebiidae	2	1
Polycentropodidae	6	1

Statistical Analysis

Number of Taxa: 24
Total Number of Individuals: 100
% Contribution of Dominant Family: 24.00 % (Elmidae)
Family Biotic Index: 4.36
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 13
% EPT: 44.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 139 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 31.0 ' / < 1.0 - 1.0 '
Substrate: Cobbles / Silt....StreamBank Vegetation/Stability: Grass / Trees / Shrubs/Fair
Canopy: Mostly Open....Other: Water temp 19.8 C / pH 7.7 SU / DO 7.6 mg/L / Cond 191umhos; Agriculture- livestock / Rural / Fish / Macrophytes
Some periphyton / Drought emergency;

Station: AN0032
Paulins Kill, Rt 46, Knowlton Twp, Warren County
Portland USGS Quadrangle
Date Sampled: 08/13/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	37
Elmidae	4	15
Gammaridae	4	11
BloodRed Chironomidae	8	9
Chironomidae	6	5
Corydalidae	0	3
Ancylidae	6	2
Heptageniidae	4	2
Polycentropodidae	6	2
Physidae	7	2
Psephenidae	4	2
Hydrobiidae	8	1
Corbiculidae	8	1
Planariidae	4	1
Ephemerellidae	1	1
Planorbidae	6	1
Empididae	6	1
Oligoneuriidae	2	1
Brachycentridae	1	1
Tetrastemmatidae	7	1
Simuliidae	6	1

Statistical Analysis

Number of Taxa: 21
Total Number of Individuals: 100
% Contribution of Dominant Family: 37.00 % (Hydropsychidae)
Family Biotic Index: 4.57
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 44.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 182 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 68.0 ' / 2.0 '
Substrate: Cobbles / Gravel / Sand....StreamBank Vegetation/Stability: Trees / Shrubs/Good
Canopy: Partly Open....Other: Water temp 24.8 C / pH 8.0 SU / DO 7.9 mg/L / Cond 525 umhos; Suburban / Forested / Storm sewers / filamentous algae
Drought emergency;

Station: AN0032A
Paulins Kill, Vail Rd, Blairstown Twp, Warren County
Portland USGS Quadrangle
Date Sampled: 07/25/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydrobiidae	8	28
Helicopsychidae	3	27
Gammaridae	4	10
Elmidae	4	9
Hydropsychidae	4	3
Physidae	7	3
Ephemerellidae	1	3
BloodRed Chironomidae	8	2
Planariidae	4	2
Lepidostomatidae	1	2
Psephenidae	4	2
Simuliidae	6	2
Baetidae	4	1
Perlidae	1	1
Hydroptilidae	4	1
Heptageniidae	4	1
Lumbricidae	10	1
Sphaeriidae	8	1
Tricorythidae	4	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 100
% Contribution of Dominant Family: 28.00 % (Hydrobiidae)
Family Biotic Index: 4.98
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 9
% EPT: 40.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 173 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 116.0 ' / <1.0 - 1.0 '
Substrate: Cobbles / Gravel / Sand....StreamBank Vegetation/Stability: Trees / Shrubs / Grass/Good
Canopy: Mostly Open....Other: Water temp 23.3 C / pH 8.7 SU / DO 8.8 mg/L / Cond 469 umhos; Agriculture- livestock / Rural / Macrophytes
Drought emergency;

Station: AN0033
Delawanna Ck, Rt 46, Knowlton Twp, Warren County
Portland USGS Quadrangle
Date Sampled: 08/13/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Elmidae	4	43
Helicopsychidae	3	19
Asellidae	8	8
Heptageniidae	4	7
Planariidae	4	5
Perlidae	1	4
Aeshnidae	3	4
Tetrastemmatidae	7	4
Chironomidae	6	3
Psephenidae	4	3
Sphaeriidae	8	3
BloodRed Chironomidae	8	2
Gammaridae	4	1
Planorbidae	6	1
Enchytraeidae	10	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 108
% Contribution of Dominant Family: 39.81 % (Elmidae)
Family Biotic Index: 4.40
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 27.78
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 133 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 12 ' / <1.0 '
Substrate: Cobbles / Gravel / Sand....StreamBank Vegetation/Stability: Trees/Fair
Canopy: Mostly Closed....Other: Water temp 20.8 C / pH 7.7 SU / DO 8.7 mg/L / Cond 314 umhos; Suburban / Adjacent to gas station & truck stop on both banks
dirt and rubble dumped along bank ; Drought emergency

Station: AN0034
Ramseysburg Creek , Rt 46, Knowlton Twp, Warren County
Portland USGS Quadrangle
Date Sampled: 06/10/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Baetidae	4	55
Chironomidae	6	14
Ephemerellidae	1	14
Glossosomatidae	0	5
Heptageniidae	4	3
Nemouridae	2	2
Elmidae	4	2
Siphlonuridae	7	1
Gammaridae	4	1
Lumbricidae	10	1
Limnephilidae	4	1
Psephenidae	4	1
Philopotamidae	3	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 101
% Contribution of Dominant Family: 54.46 % (Baetidae)
Family Biotic Index: 3.70
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 81.19
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 167 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 16 ' / < 1.0 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Partly Open....Other: Water temp. 14.1 C /pH 8.2 SU /DO 10.4 mg/L /Cond 230 umhos; Rural / forested / agriculture-cropland
Farm on left bank, downstream;

Station: AN0035
Pequest R, Rt 206, Andover Twp, Sussex County
Newton West USGS Quadrangle
Date Sampled: 10/01/02

Family	Family Tolerance Value (FTV)	Number of Individuals
BloodRed Chironomidae	8	33
Tubificidae	10	14
Hydrobiidae	8	12
Planorbidae	6	12
Physidae	7	7
Gammaridae	4	6
Elmidae	4	5
Coenagrionidae	9	4
Chironomidae	6	3
Planariidae	4	2
Lymnaeidae	6	1
Valvatidae	4	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 33.00 % (BloodRed Chironomidae)
Family Biotic Index: 7.37
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 0
% EPT: 0.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 114 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 13 / 2
Substrate: Cobbles, gravel/sand, silt....StreamBank Vegetation/Stability: Grasses/Fair
Canopy: Open....Other: Water temp. 16.3C /pH 7.2SU /DO 5.6ppm /Cond. 510umhos/cm;
Drought emergency. Agriculture-cropland.
Periphyton, crayfish, beaver dam observed;

Station: AN0036
Unt To Pequest River, Rt 603 (Brighton Rd), Green Twp, Susses County
Tranquility USGS Quadrangle
Date Sampled: 10/01/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	48
Hydrobiidae	8	19
Asellidae	8	17
Plagiostomidae	4	3
Coenagrionidae	9	3
Chironomidae	6	2
Planorbidae	6	2
Tubificidae	10	2
BloodRed Chironomidae	8	1
Haliplidae	5	1
Helicopsychidae	3	1
Leptoceridae	4	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 48.00 % (Gammaridae)
Family Biotic Index: 5.83
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 2.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 139 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 22.0/ 1.0
Substrate: Gravel/sand....StreamBank Vegetation/Stability: Trees / Shrubs/Good
Canopy: Open....Other: Water temp 15.7 C / pH 7.9 SU / DO 12.0 mg/L / Cond 502 umhos;
Agriculture- cropland / Macrophytes / Filamentous algae
Drought emergency;

Station: AN0037
Pequest River, Pequest Rd, Green Twp, Sussex County
Tranquility USGS Quadrangle
Date Sampled: 10/01/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	27
Elmidae	4	21
Hydropsychidae	4	10
Heptageniidae	4	8
Psephenidae	4	6
Chironomidae	6	6
Baetidae	4	3
Coenagrionidae	9	2
Philopotamidae	3	2
Perlidae	1	2
Physidae	7	2
Tetrastemmatidae	7	2
Corydalidae	0	1
Ancylidae	6	1
Lepidostomatidae	1	1
Tubificidae	10	1
Lumbricidae	10	1
Brachycentridae	1	1
Leptoceridae	4	1
Polycentropodidae	6	1
Psychomyiidae	2	1

Statistical Analysis

Number of Taxa: 21
Total Number of Individuals: 100
% Contribution of Dominant Family: 27.00 % (Gammaridae)
Family Biotic Index: 4.30
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 10
% EPT: 30.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 147 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 28 ' / 1 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs, grasses/Good
Canopy: Partly Open....Other: Water temp. 15.5 C /pH 7.7 SU /DO 9.4 mg/L /Cond 385 umhos; Rural
Drought emergency. Macrophytes and fish observed; Storm sewers, small dam

Station: AN0038
Trout Bk, Rt 612, Allamuchy Twp, Warren County
Tranquility USGS Quadrangle
Date Sampled: 10/08/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	49
Elmidae	4	19
Hydropsychidae	4	11
Limnephilidae	4	10
Chironomidae	6	4
Sphaeriidae	8	3
Ephemerellidae	1	2
Tubificidae	10	2
Asellidae	8	1
Planariidae	4	1
Polycentropodidae	6	1

Statistical Analysis

Number of Taxa: 11
Total Number of Individuals: 103
% Contribution of Dominant Family: 47.57 % (Gammaridae)
Family Biotic Index: 4.31
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 23.30
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 118 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 8/1.5 '
Substrate: Sand, silt....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Mostly Closed....Other: Water temp.10.6 C /pH 8.1 SU /DO 10.9 mg/L / Cond. 637 umhos; Agriculture-cropland / rural / forested
Stream channeled through pipe under bridge; Drought emergency

Station: AN0039
Pequest River, Rt 615, Allamuchy Twp, Warren County
Tranquility USGS Quadrangle
Date Sampled: 10/08/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	24
Elmidae	4	21
Philopotamidae	3	11
Planariidae	4	11
Heptageniidae	4	9
Chironomidae	6	7
Simuliidae	6	5
Brachycentridae	1	3
Baetidae	4	2
Psephenidae	4	2
Gammaridae	4	2
Tipulidae	3	1
Limnephilidae	4	1
Tetrastemmatidae	7	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 100
% Contribution of Dominant Family: 24.00 % (Hydropsychidae)
Family Biotic Index: 4.06
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 50.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 156 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear, gray tint....Flow: Moderate....Width/Depth (ft): 15 ' / 1.5 '
Substrate: Cobbles, mud, silt....StreamBank Vegetation/Stability: Trees, shrubs, grasses/Good
Canopy: Partly open....Other: Water temp.12.9 C / pH 7.8 SU / DO 9.6 mg/L /Cond. 673 umhos; Agriculture-cropland, rural, forested
Periphyton, macrophytes, leaf litter, storm sewers observed.; Drought emergency

Station: AN0040
Bear Ck, Shades Of Death Rd, Allamuchy Twp, Warren County
Blairstown USGS Quadrangle
Date Sampled: 10/8/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	64
Hydrobiidae	8	12
Chironomidae	6	7
Elmidae	4	4
Asellidae	8	3
Polycentropodidae	6	3
Limnephilidae	4	1
Gomphidae	1	1
Planariidae	4	1
Lymnaeidae	6	1
Coenagrionidae	9	1
Corydalidae	0	1
BloodRed Chironomidae	8	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 100
% Contribution of Dominant Family: 64.00 % (Gammaridae)
Family Biotic Index: 4.84
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 4.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 164 (Optimal) USEPA Protocol
Deficiency(s) noted: Gammaridae Family Overwhelmingly Dominant -
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 6 ' / <2 '
Substrate: Gravel/silt....StreamBank Vegetation/Stability: Grasses, shrubs, trees/Good
Canopy: Open....Other: Water temp 14.7 C / pH 7.8 SU / DO 8.2 mg/L / Cond 552 umhos;
Ag-livestock, Rural, Forested, beaver dam
abundant filamentous algae, periphyton, frogs, crayfish; Drought emergency

Station: AN0040A
Bear Ck, Rt 519 (Dark Moon Rd), Frelinghuysen Twp, Warren County
Tranquility USGS Quadrangle
Date Sampled: 10/8/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	67
Elmidae	4	22
Planariidae	4	6
Tubificidae	10	3
Corixidae	9	1
Ephemerellidae	1	1

Statistical Analysis

Number of Taxa: 6
Total Number of Individuals: 100
% Contribution of Dominant Family: 67.00 % (Gammaridae)
Family Biotic Index: 4.20
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 1.00
NJIS Rating: 9
Biological Condition: Moderately Impaired
Habitat Analysis: 123 (Suboptimal) USEPA Protocol
Deficiency(s) noted: Gammaridae Family Overwhelmingly Dominant -
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 5 / <1
Substrate: Gravel....StreamBank Vegetation/Stability: Grasses, few trees/Poor
Canopy: Partly Open....Other: Water temp 15.8 C / pH 7.9 SU / DO 10.5 mg/L / Cond 488 umhos; Horse farm across from site
Ag - livestock, rural, forested; periphyton, Drought emergency

Station: AN0041
Pequest River, Cemetery Rd, Independence Twp, Warren County
Washington USGS Quadrangle
Date Sampled: 10/17/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Corixidae	9	74
Tubificidae	10	8
Elmidae	4	5
BloodRed Chironomidae	8	3
Asellidae	8	2
Calopterygidae	5	1
Ceratopogonidae	6	1
Dolichopodidae	4	1
Gammaridae	4	1
Leptophlebiidae	2	1
Tipulidae	3	1
Sphaeriidae	8	1
Tabanidae	6	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 100
% Contribution of Dominant Family: 74.00 % (Corixidae)
Family Biotic Index: 8.44
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 1.00
NJIS Rating: 6
Biological Condition: Severely Impaired
Habitat Analysis: 108 (Marginal) USEPA Protocol
Deficiency(s) noted: Corixidae Family Overwhelmingly Dominant -
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Turbid....Flow: Moderate....Width/Depth (ft): 44.5 / 3 '
Substrate: Silt....StreamBank Vegetation/Stability: Trees, grass, shrubs/Poor
Canopy: Partly Open....Other: Water temp. 10.7 C /pH 7.8 SU /DO 9.4 mg/L /Cond 498 umhos; Rural
Fish observed. Scoured & eroded stream bank, storm sewers.; Drought emergency

Station: AN0042
Furnace Bk, Pequest Road, White Twp, Warren County
Washington USGS Quadrangle
Date Sampled: 10/17/02

Family	Family Tolerance Value (FTV)	Number of Individuals
BloodRed Chironomidae	8	32
Tubificidae	10	32
Chironomidae	6	8
Ancylidae	6	6
Physidae	7	5
Elmidae	4	5
Coenagrionidae	9	3
Gammaridae	4	2
Hydropsychidae	4	1
Corbiculidae	8	1
Glossiphoniidae	8	1
Planorbidae	6	1
Naididae	7	1
Lymnaeidae	6	1
Tabanidae	6	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 32.00 % (BloodRed Chironomidae & Tubificidae)
Family Biotic Index: 7.95
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 1.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 151 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 16.0/ 3.0
Substrate: Gravel / Silt....StreamBank Vegetation/Stability: Shrubs / Grass/Good
Canopy: Mostly Open....Other: Water Temp 11.5 C / pH 7.5 SU / DO 8.3 mg/L / Cond 443 umhos; Agriculture- cropland / Rural / Macrophytes present /
Drought emergency;

Station: AN0043
Pequest River, Rt 625, White Twp, Warren County
Washington USGS Quadrangle
Date Sampled: 10/17/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	26
Ephemerellidae	1	17
Gammaridae	4	9
Lepidostomatidae	1	7
Elmidae	4	7
Asellidae	8	6
Lumbriculidae	8	6
Chironomidae	6	6
BloodRed Chironomidae	8	5
Brachycentridae	1	5
Planariidae	4	3
Hydroptilidae	4	1
Tubificidae	10	1
Tetrastemmatidae	7	1
Psephenidae	4	1
Heptageniidae	4	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 102
% Contribution of Dominant Family: 25.49 % (Hydropsychidae)
Family Biotic Index: 4.02
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 55.88
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 143 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Turbid....Flow: Fast....Width/Depth (ft): 20/3 '
Substrate: Gravel, silt....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Mostly Open....Other: Water temp.10.8 C /pH 7.3 SU /DO 11.0 mg/L /Cond 506 umhos; Macrophytes observed
Rural; Drought emergency

Station: AN0044
Mountain Lake Bk, Tamarack Rd Otl To Mountain Lk, Liberty Twp, Warren County
Washington USGS Quadrangle
Date Sampled: 10/17/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	40
BloodRed Chironomidae	8	38
Naididae	7	10
Caenidae	7	4
Hydrobiidae	8	3
Lymnaeidae	6	2
Hydropsychidae	4	1
Tubificidae	10	1
Leptoceridae	4	1
Phryganeidae	4	1
Planorbidae	6	1
Elmidae	4	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 103
% Contribution of Dominant Family: 38.83 % (Chironomidae)
Family Biotic Index: 6.89
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 6.80
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 157 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Slightly Turbid....Flow: Fast....Width/Depth (ft): 10/2.5 '
Substrate: Cobbles, gravel....StreamBank Vegetation/Stability: Shrubs, trees, grass/Fair
Canopy: Partly Open....Other: Water temp.14.5 C/pH 8.5 SU/DO 7.7 mg/L /Cond 312 umhos;
Outlet to lake
Suburban / rural; Drought emergency

Station: AN0045
Beaver Brook, Ridgeway Ave, Hope Twp, Warren County
Blairstown USGS Quadrangle
Date Sampled: 10/22/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Philopotamidae	3	18
Talitridae	8	17
Asellidae	8	14
Corydalidae	0	10
Hydropsychidae	4	7
Gomphidae	1	5
Viviparidae	6	3
Planariidae	4	3
Planorbidae	6	3
Chironomidae	6	3
Tetrastemmatidae	7	3
Psephenidae	4	3
Heptageniidae	4	3
BloodRed Chironomidae	8	2
Elmidae	4	2
Perlidae	1	1
Coenagrionidae	9	1
Tubificidae	10	1
Physidae	7	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 100
% Contribution of Dominant Family: 18.00 % (Philopotamidae)
Family Biotic Index: 4.97
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 29.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 166 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 20 / <1 '
Substrate: Cobbles, gravel, sand....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Closed....Other: Drought emergency; Salamanders and periphyton observed
Water temp. 9.0 C /pH 8.0 SU /DO 11.1 mg/L /Cond 338 umhos; Forested

Station: AN0046
Honey Run, Rt 519, Hope Twp, Warren County
Blairstown USGS Quadrangle
Date Sampled: 10/22/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Tubificidae	10	21
Elmidae	4	17
BloodRed Chironomidae	8	10
Hydrobiidae	8	7
Ceratopogonidae	6	7
Naididae	7	7
Gammaridae	4	6
Planorbidae	6	6
Psychodidae	10	4
Chironomidae	6	4
Asellidae	8	3
Tabanidae	6	2
Sphaeriidae	8	2
Planariidae	4	1
Psephenidae	4	1
Dytiscidae	5	1
Coenagrionidae	9	1
Erpobdellidae	8	1
Leptoceridae	4	1
Haliplidae	5	1
Physidae	7	1
Sialidae	4	1

Statistical Analysis

Number of Taxa: 22
Total Number of Individuals: 105
% Contribution of Dominant Family: 20.00 % (Tubificidae)
Family Biotic Index: 6.96
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 0.95
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 131 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 17.0/1.0-2.0
Substrate: Cobbles, gravel/sand, mud, silt....StreamBank Vegetation/Stability: Trees/ Shrubs/Good
Canopy: Partly Open....Other: Water Temp 7.0 C / pH 6.9 SU / DO 11.6 mg/L / Cond 403 umhos; Agriculture- cropland / Rural / Some macrophytes /
Stream partially blocked downstream / Drought emergency;

Station: AN0047
Beaver Brook, Off Rt 618 At Woodsedge Ct, White Twp, Warren County
Belvidere USGS Quadrangle
Date Sampled: 10/22/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Elmidae	4	17
Helicopsychidae	3	12
Gammaridae	4	10
Ephemerellidae	1	10
Sphaeriidae	8	9
Perlidae	1	8
Heptageniidae	4	7
Philopotamidae	3	6
Hydropsychidae	4	5
Psephenidae	4	4
Odontoceridae	0	4
Brachycentridae	1	2
Tricorythidae	4	2
Hydrobiidae	8	1
Limnephilidae	4	1
Ephemeridae	4	1
Tetrastemmatidae	7	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 100
% Contribution of Dominant Family: 17.00 % (Elmidae)
Family Biotic Index: 3.49
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 11
% EPT: 58.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 172 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 35 / 2 '
Substrate: Cobbles, boulders....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Partly Open....Other: Drought emergency. Storm sewers; Crayfish, minnows, periphyton observed
Water temp. 8.2 C /pH 7.2 SU /DO 12.4 mg/L /Cond 481 umhos; Rural / Forested / Suburban - newer developement

Station: AN0048
Pequest River, Off Water St, Belvidere, Warren County
Belvidere USGS Quadrangle
Date Sampled: 10/22/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	17
Asellidae	8	14
Elmidae	4	13
Philopotamidae	3	11
Hydropsychidae	4	9
Ephemerellidae	1	9
Psephenidae	4	8
Lumbriculidae	8	5
Heptageniidae	4	4
Helicopsychidae	3	2
Sphaeriidae	8	2
Hydrobiidae	8	1
Baetidae	4	1
Haplotaxidae	8	1
Hydroptilidae	4	1
Polycentropodidae	6	1
Chironomidae	6	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 100
% Contribution of Dominant Family: 17.00 % (Gammaridae)
Family Biotic Index: 4.56
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 38.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 158 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 50 / 2 '
Substrate: Cobbles, gravel/sand, boulders, bedrock....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Partly Open....Other: Drought emergency; Water temp. 9.0 C /pH 7.2 SU /DO 11.2 mg/L Cond 597 umhos
Urban - town of Belvidere;

Station: AN0049
Pophandusing Bk, Spring St, Belvidere, Warren County
Belvidere USGS Quadrangle
Date Sampled: 10/24/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Elmidae	4	51
Lumbricidae	10	14
Philopotamidae	3	5
Psephenidae	4	4
Capniidae	1	3
Physidae	7	3
Hydropsychidae	4	2
Lymnaeidae	6	2
Heptageniidae	4	2
Ephemerellidae	1	1
Naididae	7	1
Simuliidae	6	1
Gammaridae	4	1
Ancylidae	6	1
Planariidae	4	1
Gomphidae	1	1
Tubificidae	10	1
Lumbriculidae	8	1
Sphaeriidae	8	1
BloodRed Chironomidae	8	1
Taeniopterygidae	2	1
Chironomidae	6	1
Tipulidae	3	1

Statistical Analysis

Number of Taxa: 23
Total Number of Individuals: 100
% Contribution of Dominant Family: 51.00 % (Elmidae)
Family Biotic Index: 5.01
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 14.00
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 160 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 12.0/ 0.5-1.0
Substrate: Cobbles / Gravel....StreamBank Vegetation/Stability: Grasses / Shrubs / Trees/Fair
Canopy: Partly Open....Other: Water temp. 6.0 C / pH 7.2 SU / DO 12.9 mg/L / Cond 304 umhos; Rural / Drought emergency

Station: AN0050
Buck Horn Ck, Hutchinson Rd, Harmony Twp, Warren County
Bangor USGS Quadrangle
Date Sampled: 10/24/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Elmidae	4	60
Psephenidae	4	7
Limnephilidae	4	7
Lumbricidae	10	5
Baetidae	4	3
Chironomidae	6	3
Tetrastemmatidae	7	3
Hydropsychidae	4	2
Tipulidae	3	2
Perlidae	1	1
Calopterygidae	5	1
Oligoneuriidae	2	1
Tubificidae	10	1
Lumbriculidae	8	1
Physidae	7	1
BloodRed Chironomidae	8	1
Stratiomyidae	10	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 100
% Contribution of Dominant Family: 60.00 % (Elmidae)
Family Biotic Index: 4.62
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 5
% EPT: 14.00
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 137 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 8.0/<1.0
Substrate: Cobbles / Gravel ....StreamBank Vegetation/Stability: Grasses/ Trees/ Shrubs/Fair
Canopy: Mostly Open....Other: Water temp 5.5 C / pH 7.6 SU / DO 13.0 mg/L / Cond 218 umhos; Agrilculture- cropland / Rural / Mulch farm upstream
Drought emergency;

Station: AN0051
Lopatcong Ck, Montana Mountain Rd, Harmony Twp, Warren County
Bloomsbury USGS Quadrangle
Date Sampled: 11/06/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	24
Elmidae	4	17
Ephemerellidae	1	16
Lumbriculidae	8	6
Tubificidae	10	6
Tipulidae	3	5
Peltoperlidae	1	5
Heptageniidae	4	4
Chironomidae	6	3
Perlidae	1	2
Asellidae	8	1
Philopotamidae	3	1
Psephenidae	4	1
Enchytraeidae	10	1
Hydroptilidae	4	1
Planariidae	4	1
Perlodidae	2	1
Lepidostomatidae	1	1
Polycentropodidae	6	1
Ptychopteridae	8	1
Rhyacophilidae	0	1
Simuliidae	6	1
Sphaeriidae	8	1
Taeniopterygidae	2	1

Statistical Analysis

Number of Taxa: 24
Total Number of Individuals: 102
% Contribution of Dominant Family: 23.53 % (Hydropsychidae)
Family Biotic Index: 4.02
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 12
% EPT: 56.86
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 177 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 12.0/ <1.0-2.0
Substrate: Cobbles/ Gravel/ Sand....StreamBank Vegetation/Stability: Grasses/ Trees/ Shrubs/Good
Canopy: Mostly Closed....Other: Water temp 8.1 C / pH 7.3 SU / DO 12.3 mg/L / Cond 203 umhos; Rural / Forested / adjacent to residence / salamanders
Drought emergency;

Station: AN0052
Lopatcong Ck, Rt 57, Lopatcong Twp, Warren County
Easton USGS Quadrangle
Date Sampled: 11/06/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Physidae	7	19
Tubificidae	10	15
Elmidae	4	14
Chironomidae	6	10
Ancylidae	6	7
Lumbriculidae	8	7
Lymnaeidae	6	6
Gammaridae	4	5
BloodRed Chironomidae	8	3
Hydropsychidae	4	3
Sphaeriidae	8	2
Asellidae	8	1
Calopterygidae	5	1
Coenagrionidae	9	1
Corixidae	9	1
Erpobdellidae	8	1
Leuctridae	0	1
Psephenidae	4	1
Gomphidae	1	1
Taeniopterygidae	2	1

Statistical Analysis

Number of Taxa: 20
Total Number of Individuals: 100
% Contribution of Dominant Family: 19.00 % (Physidae)
Family Biotic Index: 6.51
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 5.00
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 178 (Optimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 19.0 / 1.0-2.0
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Shrubs / Trees / Grass/Good
Canopy: Open....Other: Water temp 7.8 C / pH 7.5 SU / DO 14.2 mg/L / Cond 218 umhos;
Agriculture- livestock: cows / Suburban
Minnows / Drought emergency;

Station: AN0053
Lopatcong Ck, Rt 122, Pohatcong Twp, Warren County
Easton USGS Quadrangle
Date Sampled: 06/11/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	80
Chironomidae	6	5
Baetidae	4	4
Elmidae	4	4
Lumbriculidae	8	3
Hydropsychidae	4	1
Enchytraeidae	10	1
Ephemerellidae	1	1
Simuliidae	6	1

Statistical Analysis

Number of Taxa: 9
Total Number of Individuals: 100
% Contribution of Dominant Family: 80.00 % (Gammaridae)
Family Biotic Index: 4.27
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 6.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 124 (Suboptimal) USEPA Protocol II
Deficiency(s) noted: Gammaridae Family Overwhelmingly Dominant -
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 24/<1
Substrate: Gravel / Sand....StreamBank Vegetation/Stability: Grass/Fair
Canopy: Open....Other: Water Temp 14.4C / pH 7.6SU / DO 10.2mg/L / Cond 384; Suburban / Frogs / Fish- Brown Trout / Drought emergency

Station: AN0054
Pohatcong Ck, Janes Chapel Rd, Mansfield Twp, Warren County
Washington USGS Quadrangle
Date Sampled: 05/31/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	24
Elmidae	4	15
Baetidae	4	13
Ephemerellidae	1	11
Leuctridae	0	5
Psephenidae	4	4
Glossosomatidae	0	3
Perlodidae	2	3
BloodRed Chironomidae	8	3
Curculionidae	7	2
Enchytraeidae	10	2
Tipulidae	3	2
Lepidostomatidae	1	2
Pteronarcyidae	0	2
Limnephilidae	4	2
Rhyacophilidae	0	2
Nemouridae	2	1
Heptageniidae	4	1
Gammaridae	4	1
Lumbriculidae	8	1
Naididae	7	1
Peltoperlidae	1	1
Sphaeriidae	8	1
Polycentropodidae	6	1

Statistical Analysis

Number of Taxa: 24
Total Number of Individuals: 103
% Contribution of Dominant Family: 23.30 % (Chironomidae)
Family Biotic Index: 3.91
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 13
% EPT: 45.63
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 167 (Optimal) EPA Protocol II
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 17/<1
Substrate: Cobbles/ Gravel/ Sand....StreamBank Vegetation/Stability: Trees/ Shrubs/Good
Canopy: Closed....Other: Water Temp 20.6C / pH 7.7SU / DO N/A / Cond 87umhos; Rural/
Forested/ Agricultural- cropland/ Fish present
Drought Emergency;

Station: AN0055
Pohatcong Ck, Rt 650, Washington Twp, Warren County
Washington USGS Quadrangle
Date Sampled: 10/29/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Heptageniidae	4	42
Hydropsychidae	4	19
Elmidae	4	10
Philopotamidae	3	9
Limnephilidae	4	5
Chironomidae	6	2
Hydrobiidae	8	1
Calopterygidae	5	1
Empididae	6	1
Corydalidae	0	1
Ancylidae	6	1
Oligoneuriidae	2	1
Brachycentridae	1	1
Leptoceridae	4	1
Physidae	7	1
Sphaeriidae	8	1
BloodRed Chironomidae	8	1
Simuliidae	6	1
Taeniopterygidae	2	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 100
% Contribution of Dominant Family: 42.00 % (Heptageniidae)
Family Biotic Index: 4.06
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 79.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 171 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 20.0/2.0
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees / Shrubs/Good
Canopy: Mostly Closed....Other: Water temp 7.5 C / pH 8.0 SU / DO 11.0 mg/L / Cond 140 umhos; Rural / Forested / fish present
Drought emergency ;

Station: AN0056
Brass Castle Ck, Brass Castle Rd, Washington Twp, Warren County
Washington USGS Quadrangle
Date Sampled: 10/29/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Lumbriculidae	8	34
Hydropsychidae	4	16
Philopotamidae	3	12
Pteronarcyidae	0	12
Peltoperlidae	1	8
Perlidae	1	5
Elmidae	4	5
Taeniopterygidae	2	4
Tipulidae	3	3
Limnephilidae	4	2
Glossosomatidae	0	2
Psephenidae	4	2
Dryopidae	5	1
Lumbricidae	10	1
Tetrastemmatidae	7	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 108
% Contribution of Dominant Family: 31.48 % (Lumbriculidae)
Family Biotic Index: 4.26
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 56.48
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 169 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 15.0/ <1.0
Substrate: Cobbles / Gravel / Sand....StreamBank Vegetation/Stability: Trees/ Shrubs/Good
Canopy: Partly Open....Other: Water temp 7.2 C / pH 8.2 SU / DO 13.2 mg/L / Cond 212 umhos; Rural / Forested
Drought emergency;

Station: AN0057
Pohatcong Ck, Buttermilk Bridge Rd, Washington Twp, Warren County
Bloomsbury USGS Quadrangle
Date Sampled: 10/29/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	31
Elmidae	4	9
Heptageniidae	4	7
Chironomidae	6	7
BloodRed Chironomidae	8	5
Limnephilidae	4	5
Asellidae	8	4
Lumbriculidae	8	4
Gomphidae	1	3
Calopterygidae	5	2
Philopotamidae	3	2
Ancylidae	6	2
Hydrobiidae	8	2
Plagiostomidae	4	2
Coenagrionidae	9	2
Tubificidae	10	2
Sphaeriidae	8	2
Perlidae	1	1
Baetidae	4	1
Aeshnidae	3	1
Ephemerellidae	1	1
Hydropsychidae	4	1
Physidae	7	1
Tetrastemmatidae	7	1
Psephenidae	4	1
Tipulidae	3	1

Statistical Analysis

Number of Taxa: 26
Total Number of Individuals: 100
% Contribution of Dominant Family: 31.00 % (Gammaridae)
Family Biotic Index: 4.97
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 18.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 106 (Marginal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 30.0/ 3.0
Substrate: Cobbles, gravel/sand, silt....StreamBank Vegetation/Stability: Trees / Grass/Fair
Canopy: Open....Other: Water temp 9.0 C / pH 7.5 SU / DO 11.8 mg/L / Cond 318 umhos; Agriculture- cropland / Rural / Large corn field upstream
Fish present. Storm sewers; Drought emergency

Station: AN0058
Pohatcong Ck, Edison Road, Franklin Twp, Warren County
Bloomsbury USGS Quadrangle
Date Sampled: 11/06/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydrobiidae	8	44
Gammaridae	4	25
Planorbidae	6	6
Physidae	7	5
Sphaeriidae	8	4
Hydropsychidae	4	3
Chironomidae	6	3
Asellidae	8	2
Ephemerellidae	1	2
Tipulidae	3	1
Coenagrionidae	9	1
Leptoceridae	4	1
Haliplidae	5	1
Tetrastemmatidae	7	1
Psephenidae	4	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 44.00 % (Hydrobiidae)
Family Biotic Index: 6.35
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 6.00
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 101 (Marginal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 30.0/ 1.0-2.0
Substrate: Cobbles....StreamBank Vegetation/Stability: Grass / Few Shrubs / Trees/Poor
Canopy: Open....Other: Water temp 7.9 C / pH 7.2 SU / DO 13.8 mg/L / Cond 288 umhos;
Agriculture- livestock / Gauging station / Geese / Fish
Tadpoles / Drought emergency;

Station: AN0059
Merrill Ck, Richline Road, Harmony Twp, Warren County
Bloomsbury USGS Quadrangle
Date Sampled: 11/06/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	42
Elmidae	4	11
Chironomidae	6	10
Heptageniidae	4	10
Leptophlebiidae	2	7
Tipulidae	3	4
Limnephilidae	4	2
Peltoperlidae	1	2
Taeniopterygidae	2	2
Ptilodactylidae	1	1
Empididae	6	1
Philopotamidae	3	1
Dryopidae	5	1
Calopterygidae	5	1
Hydroptilidae	4	1
Perlodidae	2	1
Corydalidae	0	1
Ephemerellidae	1	1
Sphaeriidae	8	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 100
% Contribution of Dominant Family: 42.00 % (Hydropsychidae)
Family Biotic Index: 3.87
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 10
% EPT: 69.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 184 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 8.0 / 1.0-2.5
Substrate: Gravel/sand , mud....StreamBank Vegetation/Stability: Shrubs / Trees/Good
Canopy: Partly Open....Other: Water temp 8.2 C / pH 7.8 SU / DO 9.2 mg/L / Cond 149 umhos; Rural / Forested / Station: small weir at gauge
Crayfish / Salamanders / Drought emergency;

Station: AN0060
Merrill Ck, A Farm Rd Off Rt 637, Greenwich Twp, Warren County
Bloomsbury USGS Quadrangle
Date Sampled: 11/06/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	27
Elmidae	4	27
Leptophlebiidae	2	8
Philopotamidae	3	7
Lumbriculidae	8	7
Ephemerellidae	1	6
Limnephilidae	4	4
Hydropsychidae	4	3
Baetidae	4	2
Rhyacophilidae	0	2
Heptageniidae	4	2
Capniidae	1	1
Asellidae	8	1
Naididae	7	1
Chironomidae	6	1
Sphaeriidae	8	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 100
% Contribution of Dominant Family: 27.00 % (Gammaridae & Elmidae)
Family Biotic Index: 3.89
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 9
% EPT: 35.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 145 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Turbid....Flow: Fast....Width/Depth (ft): 5.0/ 1.0-1.5
Substrate: Cobbles/ Gravel....StreamBank Vegetation/Stability: Shrubs/ Grass/Good
Canopy: Open....Other: Water temp 8.7 C / pH 8.0 SU / DO 11.5 mg/L / Cond 146 umhos;
Agriculture- Livestock: cows and steer
Crayfish / Salamanders / Drought emergency;

Station: AN0061
Pohatcong Ck, Carpentersville Rd, Pohatcong Twp, Warren County
Easton USGS Quadrangle
Date Sampled: 11/07/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Philopotamidae	3	27
Elmidae	4	13
Ephemerellidae	1	12
Planariidae	4	5
Hydropsychidae	4	5
Enchytraeidae	10	5
Psephenidae	4	5
Gammaridae	4	4
Glossosomatidae	0	4
Baetidae	4	3
Chironomidae	6	3
Limnephilidae	4	2
Asellidae	8	2
Heptageniidae	4	2
Lepidostomatidae	1	2
Ephemeridae	4	1
Helicopsychidae	3	1
BloodRed Chironomidae	8	1
Sphaeriidae	8	1
Taeniopterygidae	2	1
Tubificidae	10	1

Statistical Analysis

Number of Taxa: 21
Total Number of Individuals: 100
% Contribution of Dominant Family: 27.00 % (Philopotamidae)
Family Biotic Index: 3.70
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 11
% EPT: 60.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 179 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 30 ' / < 1.0 - 1.5 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees / Grasses / Shrubs/Good
Canopy: Mostly Open....Other: Water temp 7.5 C / pH 7.5 SU / DO 13.4 mg/L / Cond 373 umhos; Rural / Forested / Storm sewers / Drought emergency
Creosote smell / crayfish present;

Station: AN0062
Musconetcong River, Outlet Of Lk Hopatcong, Roxbury Twp, Morris County
Stanhope USGS Quadrangle
Date Sampled: 11/14/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	39
Gammaridae	4	31
Asellidae	8	6
Philopotamidae	3	6
Lumbriculidae	8	3
Chironomidae	6	3
Tipulidae	3	2
Naididae	7	2
Hydrophilidae	5	2
Physidae	7	2
Simuliidae	6	2
Sphaeriidae	8	2
Psephenidae	4	1
Hydroptilidae	4	1
Coenagrionidae	9	1
BloodRed Chironomidae	8	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 104
% Contribution of Dominant Family: 37.50 % (Hydropsychidae)
Family Biotic Index: 4.66
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 44.23
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 159 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 45.3/ <1.0-2.5
Substrate: Cobbles, gravel/sand, snags, boulders....StreamBank Vegetation/Stability: Trees / Shrubs/ Grass/Fair
Canopy: Mostly Open....Other: Water temp 8.7 C / pH 7.4 SU / DO 12.2 mg/L / Cond 368 umhos; Suburban / Forested- adjacent to Hopatcong State Park
Storm Sewers / Lake outlet / channelized / filamentous algae; Drought emergency

Station: AN0063
Musconetcong River, Waterloo Rd, Mt Olive Twp, Morris/ Sussex County
Stanhope USGS Quadrangle
Date Sampled: 11/14/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	32
Gammaridae	4	14
Ephemerellidae	1	11
Philopotamidae	3	10
Physidae	7	6
Elmidae	4	6
Heptageniidae	4	6
Chironomidae	6	4
Limnephilidae	4	3
Ancylidae	6	3
Plagiostomidae	4	2
Psephenidae	4	2
Planariidae	4	1
Empididae	6	1
Coenagrionidae	9	1
Leptoceridae	4	1
Sphaeriidae	8	1
Pleuroceridae	6	1
Tetrastemmatidae	7	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 106
% Contribution of Dominant Family: 30.19 % (Hydropsychidae)
Family Biotic Index: 4.05
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 59.43
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 170 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 19.5/ 1.0-3.0
Substrate: Cobbles, gravel/sand, mud, snags, boulders....StreamBank Vegetation/Stability: Trees / Shrubs / Grass/Fair
Canopy: Partly Open....Other: Water temp 8.8 C / pH 7.0 SU / DO 11.8 mg/L / Cond 408 umhos; Suburban / Forested / Industrial (contaminated site downstream)
Undercut banks / leaf litter / filamentous algae / periphyton; Gravel bar. Drought emergency

Station: AN0064
Musconetcong River, Off Rt 604, Byram Twp, Morris/ Sussex County
Stanhope USGS Quadrangle
Date Sampled: 11/14/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	35
Hydropsychidae	4	22
Elmidae	4	13
Pleuroceridae	6	9
Perlidae	1	4
Limnephilidae	4	4
Ephemerellidae	1	4
Chironomidae	6	3
Lumbriculidae	8	2
Psephenidae	4	2
Coenagrionidae	9	1
Lepidostomatidae	1	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 35.00 % (Gammaridae)
Family Biotic Index: 4.10
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 5
% EPT: 35.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 176 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 49.5 / 1.0
Substrate: Cobbles / Snags / Boulders....StreamBank Vegetation/Stability: Trees/ Shrubs / Grass/Fair
Canopy: Partly Open....Other: Water temp 9.0 C / pH 7.6 SU / DO 12.1mg/L /Cond 436 umhos; Forested (Allamuchy St. Pk.) / Drought emergency

Station: AN0065
Lubbers Run, Rt 607, Byram Twp, Sussex County
Stanhope USGS Quadrangle
Date Sampled: 11/19/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Leuctridae	0	41
Simuliidae	6	22
Enchytraeidae	10	14
Chironomidae	6	10
Rhyacophilidae	0	4
Planariidae	4	3
Lumbricidae	10	3
Naididae	7	1
Dolichopodidae	4	1
Philopotamidae	3	1

Statistical Analysis

Number of Taxa: 10
Total Number of Individuals: 100
% Contribution of Dominant Family: 41.00 % (Leuctridae)
Family Biotic Index: 3.88
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 46.00
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 154 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 2-3.5/ <1.0-1.5
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees/ Shrubs / Grass/Fair
Canopy: Mostly Closed....Other: Water temp 8.3 C / pH 6.0 SU / DO 11.1 mg/L / Cond 42 umhos; Rural / Forested / Recreational campgrounds
Periphyton, much leaf litter. Downstream highly eroded ; Drought emergency

Station: AN0066
Lubbers Run, Rt. 206, Byram Twp, Sussex County
Stanhope USGS Quadrangle
Date Sampled: 05/29/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	43
Chironomidae	6	17
Hydropsychidae	4	16
Elmidae	4	5
Physidae	7	3
Baetidae	4	2
Tipulidae	3	2
Asellidae	8	2
Ephemerellidae	1	2
Tubificidae	10	2
Naididae	7	2
Glossosomatidae	0	1
Limnephilidae	4	1
Veliidae	9	1
Leptoceridae	4	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 43.00 % (Gammaridae)
Family Biotic Index: 4.62
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 23.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 167 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 19/1
Substrate: Cobbles/ Gravel/Sand....StreamBank Vegetation/Stability: Trees/ Shrubs/Good
Canopy: Mostly Closed....Other: Water Temp 20.4C / pH 7.3SU / DO 8.9mg/L / Cond 236umhos; Suburban/ Forested
Drought Emergency;

Station: AN0067
Mine Brook, Rt 517, Mansfield Twp, Warren County
Hackettstown USGS Quadrangle
Date Sampled: 11/19/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	13
Hydrobiidae	8	6
Physidae	7	6
Tetrastemmatidae	7	6
Chironomidae	6	5
Sphaeriidae	8	5
Enchytraeidae	10	3
Hydropsychidae	4	3
Coenagrionidae	9	3
Planorbidae	6	3
Simuliidae	6	3
Tipulidae	3	3
Ancylidae	6	2
Lumbriculidae	8	2
Taeniopterygidae	2	2
Aeshnidae	3	1
Asellidae	8	1
Ceratopogonidae	6	1
Philopotamidae	3	1
Polycentropodidae	6	1
Elmidae	4	1
Tubificidae	10	1
Valvatidae	4	1

Statistical Analysis

Number of Taxa: 23
Total Number of Individuals: 73
% Contribution of Dominant Family: 17.81 % (Gammaridae)
Family Biotic Index: 6.08
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 9.59
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 168 (Optimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 7 / 1.5 '
Substrate: Silt, cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, grass, shrubs/Fair
Canopy: Partly Open....Other: Water temp. 5.7 C /pH 7.2 SU /DO 13.2 mg/L /Cond 210 umhos; Site is downstream of gold course. little riparian zone
Storm sewers. Suburban; Drought emergency

Station: AN0068
Trout Brook, Rt 57, Hackettstown, Warren County
Hackettstown USGS Quadrangle
Date Sampled: 11/19/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	33
Asellidae	8	19
Philopotamidae	3	18
Elmidae	4	10
Gammaridae	4	9
Planorbidae	6	3
Physidae	7	3
Planariidae	4	2
Lymnaeidae	6	1
Baetidae	4	1
Lumbricidae	10	1
Psychomyiidae	2	1
Tetrastemmatidae	7	1
Psephenidae	4	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 103
% Contribution of Dominant Family: 32.04 % (Hydropsychidae)
Family Biotic Index: 4.80
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 51.46
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 189 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 8 / 1.5 '
Substrate: Cobbles, gravel, sand, silt....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Partly Open....Other: Water temp. 8.0 C /pH 7.7 SU /DO 12.0 mg/L /Cond 555 umhos; New bridge, new road, adjacent to new mall
Storm sewers. Suburban; Drought emergency

Station: AN0069
Musconetcong River, Kings Highway, Mansfield Twp, Morris County
Hackettstown USGS Quadrangle
Date Sampled: 11/19/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Lumbriculidae	8	22
Gammaridae	4	19
Elmidae	4	13
Hydropsychidae	4	9
Philopotamidae	3	8
Hydrobiidae	8	7
Ephemerellidae	1	7
Asellidae	8	5
Perlidae	1	4
Heptageniidae	4	4
Psephenidae	4	3
Lepidostomatidae	1	2
Tubificidae	10	1
Physidae	7	1
Tipulidae	3	1
Chironomidae	6	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 107
% Contribution of Dominant Family: 20.56 % (Lumbriculidae)
Family Biotic Index: 4.93
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 31.78
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 189 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Slightly Turbid....Flow: Fast....Width/Depth (ft): 48 / 2 '
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Mostly Open....Other: Water temp. 6.0 C /pH 7.2 SU /DO 14.0 mg/L /Cond 332 umhos; Rural / forested
Drought emergency;

Station: AN0070
Hances Brook, Rt 57, Mansfield Twp, Warren County
Hackettstown USGS Quadrangle
Date Sampled: 11/20/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	31
Chironomidae	6	28
Physidae	7	13
Tubificidae	10	9
Planorbidae	6	6
Glossiphoniidae	8	5
Simuliidae	6	2
Capniidae	1	1
Hydrobiidae	8	1
Libellulidae	9	1
Leptoceridae	4	1
Sphaeriidae	8	1
Tipulidae	3	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 100
% Contribution of Dominant Family: 31.00 % (Hydropsychidae)
Family Biotic Index: 5.94
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 33.00
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 182 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 9.2 / <1.0-1.5
Substrate: Cobbles / Gravel / Sand....StreamBank Vegetation/Stability: Trees / Grass / Shrubs/Good
Canopy: Mostly Open....Other: Water temp 6.7 C / pH 7.1 SU / DO 11.6 mg/L / Cond 231umhos; Agriculture- cropland / Rural / Forested / Drought emergency

Station: AN0071
Unt To Musconetcong River, Rt 57, Mansfield Twp, Warren County
Washington USGS Quadrangle
Date Sampled: 11/20/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	54
Enchytraeidae	10	9
Sphaeriidae	8	8
Physidae	7	7
Limnephilidae	4	4
Leptophlebiidae	2	4
Asellidae	8	3
Hydropsychidae	4	2
Elmidae	4	2
Chironomidae	6	1
Capniidae	1	1
Viviparidae	6	1
Ephemerellidae	1	1
Perlodidae	2	1
Tubificidae	10	1
Heptageniidae	4	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 100
% Contribution of Dominant Family: 54.00 % (Gammaridae)
Family Biotic Index: 5.13
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 14.00
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 169 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 15 / 2 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Grasses, trees, shrubs/Fair
Canopy: Mostly Open....Other: Water temp. 7.1 C /pH 7.2 SU /DO 12.9 mg/L /Cond 232 umhos; Drought emergency
Agriculture - livestock / rural / forested; Storm sewers

Station: AN0072
Musconetcong River, Springtown Rd / New Hampton Rd, Lebanon Twp, Hunterdon/Warren County
High Bridge USGS Quadrangle
Date Sampled: 11/20/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	59
Planorbidae	6	8
Ephemerellidae	1	7
Asellidae	8	5
Hydrobiidae	8	3
Hydropsychidae	4	3
Sphaeriidae	8	3
Philopotamidae	3	2
Hydrophilidae	5	2
Polycentropodidae	6	2
Baetidae	4	1
Elmidae	4	1
Lymnaeidae	6	1
Taeniopterygidae	2	1
Chironomidae	6	1
Tipulidae	3	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 100
% Contribution of Dominant Family: 59.00 % (Gammaridae)
Family Biotic Index: 4.44
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 16.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 193 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 85 / 3 '
Substrate: Boulders, cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Mostly Open....Other: Drought emergency; Boulders predominant substrate. Fish and macrophytes observed
Water temp. 5.7 C /pH 7.4 SU /DO 11.5 mg/L /Cond 320 umhos; Agriculture - cropland / rural

Station: AN0073
Musconetcong River, Rt 579, Bloomsbury Boro, Warren County
Bloomsbury USGS Quadrangle
Date Sampled: 11/07/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Philopotamidae	3	20
Hydropsychidae	4	14
Elmidae	4	14
Gammaridae	4	10
Hydroptilidae	4	6
Ephemerellidae	1	6
Planariidae	4	5
Hydrobiidae	8	5
Heptageniidae	4	5
Lepidostomatidae	1	3
BloodRed Chironomidae	8	2
Lumbriculidae	8	2
Physidae	7	2
Perlidae	1	1
Tipulidae	3	1
Naididae	7	1
Corydalidae	0	1
Empididae	6	1
Psephenidae	4	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 100
% Contribution of Dominant Family: 20.00 % (Philopotamidae)
Family Biotic Index: 3.92
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 55.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 195 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 83.0/ <1.0-2.0
Substrate: Cobbles / Gravel....StreamBank Vegetation/Stability: Trees / Shrubs/ Grass//Good
Canopy: Mostly Open....Other: Water temp 7.8 C / pH 7.0 SU / DO 12.1mg/L / Cond 466 umhos; Suburban / Weir, Dam upstream / Drought emergency
Storm sewers. More riffles present downstream of weir.;

Station: AN0074
Musconetcong River, River Rd (Rt 627), Pohatcong Twp, Warren County
Riegelsville USGS Quadrangle
Date Sampled: 11/07/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Hydropsychidae	4	33
Elmidae	4	19
Lepidostomatidae	1	9
Lumbriculidae	8	7
Gammaridae	4	5
Sphaeriidae	8	5
Tipulidae	3	4
Heptageniidae	4	4
Psephenidae	4	3
Chironomidae	6	2
Psychomyiidae	2	2
Ephemerellidae	1	2
Planariidae	4	1
Ancylidae	6	1
Hydroptilidae	4	1
Pleuroceridae	6	1
Valvatidae	4	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 100
% Contribution of Dominant Family: 33.00 % (Hydropsychidae)
Family Biotic Index: 4.15
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 51.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 173 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Slightly Turbid....Flow: Fast....Width/Depth (ft): 78.0/ <1.0-3.0
Substrate: Cobbles/ Gravel....StreamBank Vegetation/Stability: Trees / Grass /Shrubs/Fair
Canopy: Mostly Open....Other: Water Temp 7.6C / pH 6.9SU / DO 12.0mg/L / Cond 450umhos; Rural / Forested / Storm Sewers / Drought emergency

Station: AN0075
Hakihokake Creek, Myler Rd, Alexandria Twp, Hunterdon County
Bloomsburg USGS Quadrangle
Date Sampled: 04/23/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	30
Ephemerellidae	1	18
Simuliidae	6	12
Glossosomatidae	0	6
Elmidae	4	6
Rhyacophilidae	0	5
Nemouridae	2	4
Heptageniidae	4	4
Perlidae	1	2
Hydropsychidae	4	2
Chloroperlidae	1	2
Empididae	6	1
Psephenidae	4	1
Gammaridae	4	1
Tipulidae	3	1
Lepidostomatidae	1	1
Leuctridae	0	1
Lumbriculidae	8	1
Ceratopogonidae	6	1
Peltoperlidae	1	1

Statistical Analysis

Number of Taxa: 20
Total Number of Individuals: 100
% Contribution of Dominant Family: 30.00 % (Chironomidae)
Family Biotic Index: 3.63
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 11
% EPT: 46.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 184 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 9 ' / 1 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Partly Open....Other: Water temp. 8.5 C /pH 8.3 SU /DO 11.7 mg/L /Cond 141 umhos; Rural / forested. Headwater
Salamanders observed;

Station: AN0076
Hakihokake Creek, Miller Park Rd, Holland Twp, Hunterdon County
Frenchtown USGS Quadrangle
Date Sampled: 04/23/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	40
Ephemerellidae	1	17
Glossosomatidae	0	12
Nemouridae	2	6
Heptageniidae	4	5
Simuliidae	6	4
Empididae	6	3
Elmidae	4	3
Perlidae	1	2
Hydropsychidae	4	2
Baetidae	4	1
Tipulidae	3	1
Lumbriculidae	8	1
Gammaridae	4	1
Perlodidae	2	1
Naididae	7	1
Limnephilidae	4	1
Psephenidae	4	1
Chloroperlidae	1	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 103
% Contribution of Dominant Family: 38.83 % (Chironomidae)
Family Biotic Index: 3.79
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 10
% EPT: 46.60
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 184 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 23 ' / <1.0 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Closed....Other: Water temp. 8.9 C /pH 8.5 SU /DO 12.8 mg/L /Cond 154 umhos; Rural / forested. Trout stocked
Fish and salamanders observed;

Station: AN0077
Hakihokake Creek, Bridge St, Milford Boro, Hunterdon County
Frenchtown USGS Quadrangle
Date Sampled: 04/23/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	41
Heptageniidae	4	12
Ephemerellidae	1	11
Elmidae	4	8
Lumbricidae	10	7
Nemouridae	2	5
Hydropsychidae	4	5
Glossosomatidae	0	3
Psephenidae	4	3
Empididae	6	2
Planariidae	4	2
Tetrastemmatidae	7	2
Simuliidae	6	2
Tipulidae	3	1
Baetidae	4	1
Philopotamidae	3	1
Oligoneuriidae	2	1
Lepidostomatidae	1	1
Lymnaeidae	6	1
Piscicolidae	7	1

Statistical Analysis

Number of Taxa: 20
Total Number of Individuals: 110
% Contribution of Dominant Family: 37.27 % (Chironomidae)
Family Biotic Index: 4.74
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 9
% EPT: 36.36
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 123 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 35 ' / 1 '
Substrate: Gravel/sand....StreamBank Vegetation/Stability: Trees/Poor
Canopy: Mostly Open....Other: Water temp. 9.1 C /pH 8.6 SU /DO 12.5 mg/L /Cond 199 umhos; Urban. Storm sewers present
Ducks observed;

Station: AN0078
Harihokake Creek, Hartpence Rd, Alexandria Twp, Hunterdon County
Frenchtown USGS Quadrangle
Date Sampled: 04/23/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Nemouridae	2	61
Chironomidae	6	16
Lumbriculidae	8	7
Ephemerellidae	1	3
Simuliidae	6	3
Tetrastemmatidae	7	3
Siphlonuridae	7	2
Heptageniidae	4	1
Empididae	6	1
Hydropsychidae	4	1
Perlodidae	2	1
Naididae	7	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 61.00 % (Nemouridae)
Family Biotic Index: 3.53
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 69.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 158 (Suboptimal) USEPA Protocol
Deficiency(s) noted: Nemouridae Family Overwhelmingly Dominant -
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 4 ' / <1.0 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Partly Open....Other: Water temp. 8.8 C /pH 8.3 SU /DO 11.3 mg/L /Cond 75 umhos;
Agriculture-livestock / forested. Headwater
Salamanders observed;

Station: AN0079
Harihokake Ck, Rt 619 (River Rd), Alexandria Twp, Hunterdon County
Frenchtown USGS Quadrangle
Date Sampled: 04/23/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	54
Ephemerellidae	1	16
Baetidae	4	8
Nemouridae	2	8
Heptageniidae	4	3
Lumbriculidae	8	2
Tipulidae	3	1
Caenidae	7	1
Empididae	6	1
Enchytraeidae	10	1
Gammaridae	4	1
Lepidostomatidae	1	1
Elmidae	4	1
Polycentropodidae	6	1
Simuliidae	6	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 54.00 % (Chironomidae)
Family Biotic Index: 4.63
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 38.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 174 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 25 ' / <1.0'
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Closed....Other: Water temp. 9.8 C /pH 8.5 SU /DO 11.9 mg/L /Cond 147 umhos; Suburban / forested. Gas/diesel facility downstream.
Filamentous algae observed;

Station: AN0080
Nishisakawick Creek, Airport Rd, Alexandria Twp, Hunterdon County
Frenchtown USGS Quadrangle
Date Sampled: 04/23/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Nemouridae	2	44
Chironomidae	6	29
Naididae	7	9
Simuliidae	6	7
Ephemerellidae	1	6
Heptageniidae	4	4
Hydropsychidae	4	1
Elmidae	4	1
Gomphidae	1	1
Empididae	6	1
Lepidostomatidae	1	1
Tetrastemmatidae	7	1
Psephenidae	4	1
Rhyacophilidae	0	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 107
% Contribution of Dominant Family: 41.12 % (Nemouridae)
Family Biotic Index: 3.89
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 53.27
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 170 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 5 ' / <1.0 '
Substrate: Gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Open....Other: Water temp. 10.8 C /pH 7.9 SU /DO 11.4 mg/L /Cond 77 umhos; Rural / forested. Headwater
Salamanders and algae observed;

Station: AN0081
Nishisakawick Creek, Off Creek Rd, Alexandria Twp, Hunterdon County
Frenchtown USGS Quadrangle
Date Sampled: 04/29/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	45
Simuliidae	6	23
Nemouridae	2	8
Naididae	7	6
Caenidae	7	5
BloodRed Chironomidae	8	5
Ephemerellidae	1	5
Siphlonuridae	7	3
Lepidostomatidae	1	2
Elmidae	4	2
Baetidae	4	1
Hydropsychidae	4	1
Gammaridae	4	1
Perlodidae	2	1
Limnephilidae	4	1
Heptageniidae	4	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 110
% Contribution of Dominant Family: 40.91 % (Chironomidae)
Family Biotic Index: 5.45
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 10
% EPT: 25.45
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 175 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 17 ' / < 1 - 1.0 '
Substrate: Cobbles, gravel, bedrock....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Mostly Open....Other: Water temp. 14.3 C /pH 9.0 SU /DO 10.6 mg/L /Cond 180 umhos; Rural / forested. Trout stocked
Some filamentous algae;

Station: AN0082
Nishisakawick Creek, Creek Rd, Frenchtown Boro, Hunterdon County
Frenchtown USGS Quadrangle
Date Sampled: 04/29/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	29
Simuliidae	6	19
Nemouridae	2	14
Ephemerellidae	1	9
Naididae	7	4
Baetidae	4	3
Oligoneuriidae	2	3
Caenidae	7	2
Glossosomatidae	0	1
Tipulidae	3	1
Asellidae	8	1
Hydropsychidae	4	1
Empididae	6	1
Gammaridae	4	1
Enchytraeidae	10	1
Helicopsychidae	3	1
Talitridae	8	1
Perlodidae	2	1
Perlidae	1	1
Leptophlebiidae	2	1
Tetrastemmatidae	7	1
Psephenidae	4	1
Limnephilidae	4	1
Siphlonuridae	7	1
Heptageniidae	4	1

Statistical Analysis

Number of Taxa: 25
Total Number of Individuals: 100
% Contribution of Dominant Family: 29.00 % (Chironomidae)
Family Biotic Index: 4.62
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 14
% EPT: 40.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 185 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 30 ' / < 1.0 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, grass, shrubs/Good
Canopy: Mostly Open....Other: Water temp. 13.4 C /pH 9.1 SU /DO 12.8 mg/L /Cond 184 umhos; Forested/suburban. Strip mall adjacent to stream
Filamentous algae observed. Trout stocked.;

Station: AN0083
Little Nishisakawick Creek, Rt 29, Frenchtown Boro, Hunterdon County
Frenchtown USGS Quadrangle
Date Sampled: 04/29/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	41
Naididae	7	23
Baetidae	4	8
Lumbriculidae	8	6
Simuliidae	6	5
Nemouridae	2	3
Ephemerellidae	1	3
Siphlonuridae	7	2
Empididae	6	1
Enchytraeidae	10	1
Perlodidae	2	1
Lumbricidae	10	1
Elmidae	4	1
Leptophlebiidae	2	1
BloodRed Chironomidae	8	1
Physidae	7	1
Sphaeriidae	8	1
Glossosomatidae	0	1
Psephenidae	4	1
Tipulidae	3	1

Statistical Analysis

Number of Taxa: 20
Total Number of Individuals: 103
% Contribution of Dominant Family: 39.81 % (Chironomidae)
Family Biotic Index: 5.86
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 18.45
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 159 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 6 ' / < 1.0 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, grass, shrubs/Fair
Canopy: Partly Open....Other: Water temp. 13.5 C /pH 8.8 SU /DO 11.4 mg/L /Cond 233 umhos; Rural/forested.
Filamentous algae abundant, ducks, salamander.; Strange odor. White precipitate on cobbles.

Station: AN0084
Copper Creek, Horseshoe Bend Rd, Kingwood Twp, Hunterdon County
Frenchtown USGS Quadrangle
Date Sampled: 04/29/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	29
Siphlonuridae	7	25
Simuliidae	6	19
Nemouridae	2	8
Perlodidae	2	5
Limnephilidae	4	5
Ephemerellidae	1	3
Heptageniidae	4	2
Veliidae	9	1
Naididae	7	1
Leptophlebiidae	2	1
Physidae	7	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 29.00 % (Chironomidae)
Family Biotic Index: 5.45
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 49.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 159 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 4 ' / < 1.0 '
Substrate: Bedrock, cobbles, gravel....StreamBank Vegetation/Stability: Trees, grass, shrubs/Fair
Canopy: Partly Open....Other: Water temp. 13.5 C /pH 8.6 SU /DO 11.9 mg/L /Cond 195 umhos; Rural / forested.
Filamentous algae present. White precipitate on rocks/banks;

Station: AN0085
Warford Creek, Rt 29, Kingwood Twp, Hunterdon County
Lumberville USGS Quadrangle
Date Sampled: 05/01/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Naididae	7	33
Chironomidae	6	19
Ephemerellidae	1	17
Nemouridae	2	11
Siphlonuridae	7	4
Perlodidae	2	4
Heptageniidae	4	3
Baetidae	4	1
Empididae	6	1
Gomphidae	1	1
Lymnaeidae	6	1
Limnephilidae	4	1
Psephenidae	4	1
Rhyacophilidae	0	1
Chloroperlidae	1	1
Tabanidae	6	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 100
% Contribution of Dominant Family: 33.00 % (Naididae)
Family Biotic Index: 4.64
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 9
% EPT: 43.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 180 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 10 / < 1.0 '
Substrate: Bedrock, cobbles....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Closed....Other: Water temp. 12.2 C /pH 7.7 SU /DO 10.3 mg/L /Cond 124 umhos; Forested
Filamentous algae and periphyton observed;

Station: AN0086
Lockatong Creek, Oak Grove Rd, Franklin Twp, Hunterdon County
Pittstown USGS Quadrangle
Date Sampled: 05/01/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	20
Heptageniidae	4	17
Psephenidae	4	16
Ephemerellidae	1	14
Hydropsychidae	4	11
Elmidae	4	7
Perlodidae	2	5
Sphaeriidae	8	3
Baetidae	4	1
Nemouridae	2	1
Tabanidae	6	1
BloodRed Chironomidae	8	1
Lepidostomatidae	1	1
Tubificidae	10	1
Naididae	7	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 20.00 % (Chironomidae)
Family Biotic Index: 4.10
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 50.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 149 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 20 ' / < 1.0 '
Substrate: Cobbles, silt....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Open....Other: Water temp. 14.8 C /pH 7.6 SU /DO 9.9 mg/L /Cond 152 umhos; Agriculture - cropland / Rural
Filamentous algae, periphyton, fish, salamanders;

Station: AN0087
Lockatong Creek, Rt 12, Kingwood Twp, Hunterdon County
Pittstown USGS Quadrangle
Date Sampled: 05/01/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	35
Baetidae	4	14
Elmidae	4	12
Psephenidae	4	10
Nemouridae	2	5
Philopotamidae	3	4
Heptageniidae	4	4
Hydrobiidae	8	2
Ephemerellidae	1	2
Helicopsychidae	3	2
Planorbidae	6	2
Naididae	7	2
Talitridae	8	1
Hydropsychidae	4	1
Oligoneuriidae	2	1
Lumbriculidae	8	1
Nematoda	6	1
Simuliidae	6	1

Statistical Analysis

Number of Taxa: 18
Total Number of Individuals: 100
% Contribution of Dominant Family: 35.00 % (Chironomidae)
Family Biotic Index: 4.76
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 33.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 144 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 24 ' / < 1.0 '
Substrate: Cobbles, silt....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Partly Open....Other: Water temp. 13.8 C /pH 7.6 SU /DO 9.1 mg/L /Cond 182 umhos; Rural. Garden center upstream, land cleared on right bank.
Filamentous algae and periphyton observed.;

Station: AN0088
Lockatong Creek, Rt 519, Kingwood Twp, Hunterdon County
Lumberville USGS Quadrangle
Date Sampled: 05/01/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	39
Elmidae	4	13
Psephenidae	4	10
Perlidae	1	8
Caenidae	7	5
Lumbriculidae	8	5
Naididae	7	5
Simuliidae	6	4
Heptageniidae	4	4
Ephemerellidae	1	2
Baetidae	4	1
Coenagrionidae	9	1
Tubificidae	10	1
Lepidostomatidae	1	1
BloodRed Chironomidae	8	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 39.00 % (Chironomidae)
Family Biotic Index: 5.18
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 21.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 160 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 32 ' / < 1.0 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Mostly Open....Other: Water temp. 15.2 C /pH 7.8 SU /DO 9.0 mg/L /Cond 185 umhos; Rural
Periphyton observed. Trout stocked;

Station: AN0089
Lockatong Creek, Rt 29, Delaware Twp, Hunterdon County
Lumberville USGS Quadrangle
Date Sampled: 05/06/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	33
Baetidae	4	22
Gammaridae	4	7
Naididae	7	6
Nemouridae	2	5
Simuliidae	6	4
Philopotamidae	3	4
Ephemerellidae	1	3
Psephenidae	4	3
Elmidae	4	3
Leptophlebiidae	2	2
Heptageniidae	4	2
Hydropsychidae	4	1
BloodRed Chironomidae	8	1
Planariidae	4	1
Perlidae	1	1
Pyralidae	5	1
Planorbidae	6	1

Statistical Analysis

Number of Taxa: 18
Total Number of Individuals: 100
% Contribution of Dominant Family: 33.00 % (Chironomidae)
Family Biotic Index: 4.69
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 40.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 172 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 86 ' / < 1.0 - 2 '
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees, grass, shrubs/Fair
Canopy: Mostly Open....Other: Water temp. 13.0 C /pH 8.1 SU /DO 7.7 mg/L /Cond 166 umhos; Rural / forested. Adjacent to RR bridge
Left bank severely eroded;

Station: AN0090
Wickecheoke Creek, Rt 579, Raritan Twp, Hunterdon County
Pittstown USGS Quadrangle
Date Sampled: 05/01/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Asellidae	8	26
Perlodidae	2	19
Naididae	7	14
Nemouridae	2	10
Chironomidae	6	9
Leptophlebiidae	2	8
Philopotamidae	3	8
Simuliidae	6	4
Gammaridae	4	3
Siphlonuridae	7	2
Elmidae	4	2
Limnephilidae	4	1
Hydroptilidae	4	1
Sphaeriidae	8	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 108
% Contribution of Dominant Family: 24.07 % (Asellidae)
Family Biotic Index: 4.93
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 45.37
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 157 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 13' < 1.0'
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs, grass/Fair
Canopy: Mostly Open....Other: Water temp. 16.0 C /pH 7.8 SU /DO 9.7 mg/L /Cond 188 umhos; Rural
Macrophytes, filamentous algae, periphyton and fish observed.;

Station: AN0091
Wickecheoke Creek, Locktown/Sergeantsville Rd, Delaware Twp, Hunterdon County
Stockton USGS Quadrangle
Date Sampled: 05/06/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	39
Perlodidae	2	10
Perlidae	1	10
Philopotamidae	3	10
Naididae	7	9
Leptophlebiidae	2	7
Lumbriculidae	8	5
Nemouridae	2	4
Gammaridae	4	2
Simuliidae	6	2
Asellidae	8	1
Elmidae	4	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 39.00 % (Chironomidae)
Family Biotic Index: 4.51
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 5
% EPT: 41.00
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 165 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 39' / <1.0 - 1.5'
Substrate: Cobbles, boulders....StreamBank Vegetation/Stability: Grasses, trees, shrubs/Good
Canopy: Partly Open....Other: Water temp. 11.4 C /pH 7.8 SU /DO 5.4 mg/L /Cond 202 umhos; Rural / Agriculture-livestock
Abundant periphyton;

Station: AN0092
Plum Brook, Rt 579, Delaware Twp, Hunterdon County
Stockton USGS Quadrangle
Date Sampled: 05/06/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Naididae	7	48
Chironomidae	6	13
Hydroptilidae	4	8
Perlodidae	2	8
Nemouridae	2	6
Siphlonuridae	7	6
Dytiscidae	5	3
Physidae	7	3
Leptophlebiidae	2	2
Philopotamidae	3	2
Limnephilidae	4	1

Statistical Analysis

Number of Taxa: 11
Total Number of Individuals: 100
% Contribution of Dominant Family: 48.00 % (Naididae)
Family Biotic Index: 5.66
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 33.00
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 170 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 2.5 ' / <1.0 '
Substrate: Cobbles, boulders....StreamBank Vegetation/Stability: Trees, grasses, shrubs/Good
Canopy: Partly Open....Other: Water temp. 10.5 C /pH 7.5 SU /DO 8.6 mg/L /Cond 206 umhos; Rural
Filamentous algae present. Storm drains.;

Station: AN0093
Plum Brook, Pine Hill Rd, Delaware Twp, Hunterdon County
Stockton USGS Quadrangle
Date Sampled: 06/17/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Baetidae	4	26
Physidae	7	21
Chironomidae	6	11
Perlidae	1	7
Corduliidae	5	6
Lumbriculidae	8	4
Naididae	7	3
BloodRed Chironomidae	8	2
Enchytraeidae	10	2
Talitridae	8	2
Sphaeriidae	8	2
Tipulidae	3	2
Siphlonuridae	7	1
Aeshnidae	3	1
Hydropsychidae	4	1
Elmidae	4	1
Dytiscidae	5	1
Hydroptilidae	4	1
Perlodidae	2	1
Leptophlebiidae	2	1
Lymnaeidae	6	1
Erpobdellidae	8	1
Limnephilidae	4	1
Simuliidae	6	1
Philopotamidae	3	1

Statistical Analysis

Number of Taxa: 25
Total Number of Individuals: 101
% Contribution of Dominant Family: 25.74 % (Baetidae)
Family Biotic Index: 5.34
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 9
% EPT: 39.60
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 187 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 26 ' / < 1.0 - 1.5 '
Substrate: Cobbles, boulders, bedrock....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Mostly Closed....Other: water temp. 16.2 C /pH 7.8 SU /DO 8.8 mg/L /Cond 150 umhos; Rural / forested
Dry on previous visit. Rocks covered with dead algae; Minnows and crayfish observed

Station: AN0094
Wickecheoke Creek, Rt 604, Delaware Twp, Hunterdon County
Stockton USGS Quadrangle
Date Sampled: 05/06/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	35
Baetidae	4	32
Nemouridae	2	7
Simuliidae	6	7
Naididae	7	6
Leptophlebiidae	2	6
Philopotamidae	3	5
Heptageniidae	4	2
Gammaridae	4	1
Hydropsychidae	4	1
Hydroptilidae	4	1
Perlodidae	2	1
Psephenidae	4	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 105
% Contribution of Dominant Family: 33.33 % (Chironomidae)
Family Biotic Index: 4.66
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 52.38
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 182 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 19 ' / <1.0 - 1.0'
Substrate: Bedrock, boulders, cobbles....StreamBank Vegetation/Stability: Trees, shrubs, grasses/Good
Canopy: Mostly Closed....Other: Water temp. 11.3 C /pH 7.8 SU /DO 10.7 mg/L /Cond 168 umhos; Rural / forested
Bridge out (under construction).; Filamentous algae observed

Station: AN0095
Wickecheoke Creek, Rt 29, Delaware Twp, Hunterdon County
Stockton USGS Quadrangle
Date Sampled: 05/06/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	62
Caenidae	7	7
Nemouridae	2	6
Gammaridae	4	5
Helicopsychidae	3	5
Psephenidae	4	4
Ephemerellidae	1	3
Naididae	7	3
Simuliidae	6	2
Tetrastemmatidae	7	2
Heptageniidae	4	2
Elmidae	4	2
Hydroptilidae	4	1
Oligoneuriidae	2	1
Brachycentridae	1	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 106
% Contribution of Dominant Family: 58.49 % (Chironomidae)
Family Biotic Index: 5.25
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 24.53
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 177 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 76 ' / < 1.0 - 1.5 '
Substrate: Bedrock, boulders, cobbles....StreamBank Vegetation/Stability: Trees, shrubs, grasses/Good
Canopy: Partly Open....Other: Water temp. 11.4 C /pH 8.3 SU /DO 11.5 mg/L /Cond 188 umhos; Suburban / forested
Bridge crumbling. Storm drains.;

Station: AN0096
Alexauken Creek, Rocktown-Lambertville Rd, West Amwell Twp, Hunterdon County
Stockton USGS Quadrangle
Date Sampled: 05/08/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Naididae	7	28
Chironomidae	6	25
Ephemerellidae	1	10
Simuliidae	6	7
Elmidae	4	6
Nemouridae	2	5
Tubificidae	10	5
Baetidae	4	3
Philopotamidae	3	3
Hydropsychidae	4	2
Heptageniidae	4	2
Dytiscidae	5	1
Caenidae	7	1
Hydroptilidae	4	1
Psephenidae	4	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 28.00 % (Naididae)
Family Biotic Index: 5.39
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 27.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 138 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 15 ' / < 1.0 '
Substrate: Cobbles, gravel/sand, mud, silt....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Mostly Open....Other: Water temp. 17.3 C /pH 7.6 SU /DO 8.1 mg/L /Cond 228 umhos; Rural. Road construction, new storm drain on left bank, downstream side. Filamentous algae, periphyton and fish observed.;

Station: AN0097
Unt To Alexauken Creek, Queen Rd & Alexauken Ck Rd, West Amwell Twp, Hunterdon County
Stockton USGS Quadrangle
Date Sampled: 05/08/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	45
Naididae	7	12
Asellidae	8	8
Ephemerellidae	1	7
Baetidae	4	6
Psephenidae	4	5
Nemouridae	2	3
Perlidae	1	3
Simuliidae	6	3
Glossosomatidae	0	2
Heptageniidae	4	2
Perlodidae	2	1
Lepidostomatidae	1	1
Nematoda	6	1
Elmidae	4	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 45.00 % (Chironomidae)
Family Biotic Index: 5.17
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 25.00
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 161 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 14 ' / < 1.0 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Partly Open....Other: Water temp. 15.2 C /pH 7.9 SU /DO 8.7 mg/L /Cond 239 umhos; Rural / Agriculture-livestock.
Filamentous algae, macrophytes and frogs observed.;

Station: AN0098
Alexauken Creek, Rt 29, Lambertville, Hunterdon County
Stockton USGS Quadrangle
Date Sampled: 05/08/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	56
Naididae	7	15
Baetidae	4	9
BloodRed Chironomidae	8	6
Ephemerellidae	1	5
Nemouridae	2	4
Simuliidae	6	3
Hydropsychidae	4	2
Ceratopogonidae	6	1
Asellidae	8	1
Caenidae	7	1
Corydalidae	0	1
Gammaridae	4	1
Polycentropodidae	6	1
Tetrastemmatidae	7	1
Heptageniidae	4	1
Elmidae	4	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 109
% Contribution of Dominant Family: 51.38 % (Chironomidae)
Family Biotic Index: 5.60
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 21.10
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 172 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 38 ' / < 1.0 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Open....Other: Water temp. 16.4 C /pH 7.8 SU /DO 7.7 mg/L /Cond 280 umhos; Rural / forested. Storm sewers
Filamentous algae and storm drains observed.;

Station: AN0099
Swan Creek, Swan St (Nr Canal Overflow), Lambertville, Hunterdon County
Lambertville USGS Quadrangle
Date Sampled: 05/08/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Naididae	7	42
Chironomidae	6	36
Gammaridae	4	10
Psephenidae	4	5
Baetidae	4	3
BloodRed Chironomidae	8	2
Enchytraeidae	10	2
Nemouridae	2	1
Tubificidae	10	1
Asellidae	8	1
Hydropsychidae	4	1
Ephemerellidae	1	1
Simuliidae	6	1
Elmidae	4	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 107
% Contribution of Dominant Family: 39.25 % (Naididae)
Family Biotic Index: 6.10
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 5.61
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 102 (Marginal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 14 ' / < 1.0 '
Substrate: Cobbles, gravel/sand, silt....StreamBank Vegetation/Stability: none - concrete channel/Poor
Canopy: Open....Other: Water temp. 15.2 C /pH 7.9 SU /DO 8.9 mg/L /Cond 355 umhos; Urban. Storm sewers, channelized.
Filamentous algae, periphyton, fish, and eels observed.; Parking lot on right bank under construction /repair

Station: AN0100
Moores Creek, Barry Rd, West Amwell Twp., Hunterdon County
Lambertville USGS Quadrangle
Date Sampled: 05/08/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Nemouridae	2	35
Naididae	7	20
Chironomidae	6	17
Baetidae	4	8
Hydroptilidae	4	5
Ephemerellidae	1	3
BloodRed Chironomidae	8	3
Leptophlebiidae	2	2
Perlidae	1	2
Simuliidae	6	2
Glossosomatidae	0	1
Dytiscidae	5	1
Perlodidae	2	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 100
% Contribution of Dominant Family: 35.00 % (Nemouridae)
Family Biotic Index: 4.16
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 8
% EPT: 57.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 116 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 23 ' / 1 '
Substrate: Cobbles, gravel/sand, silt....StreamBank Vegetation/Stability: Grasses, trees/Poor
Canopy: Open....Other: Water temp. 15.4 C /pH 7.8 SU /DO 7.9 mg/L /Cond 240 umhos; Rural / Agriculture-livestock
Storm sewers, eels, periphyton, crayfish and filamentous algae observed.;

Station: AN0101
Moores Creek, Rt 29, Hopewell Twp., Mercer County
Lambertville USGS Quadrangle
Date Sampled: 05/08/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	66
Naididae	7	21
Baetidae	4	7
Nematoda	6	2
Nemouridae	2	1
Gammaridae	4	1
Coenagrionidae	9	1
BloodRed Chironomidae	8	1

Statistical Analysis

Number of Taxa: 8
Total Number of Individuals: 100
% Contribution of Dominant Family: 66.00 % (Chironomidae)
Family Biotic Index: 6.06
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 8.00
NJIS Rating: 6
Biological Condition: Severely Impaired
Habitat Analysis: 96 (Marginal) USEPA Protocol
Deficiency(s) noted: Chironomidae Family Overwhelmingly Dominant -
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 30 ' / 1 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Poor
Canopy: Mostly Open....Other: Water temp. 15.4 C /pH 7.7 SU /DO 9.5 mg/L /Cond 233 umhos; Rural. Water supply pumping station.
Minnow, periphyton and filamentous algae observed;

Station: AN0102
Jacobs Creek, Woosamonsa Rd, Hopewell Twp, Mercer County
Pennington USGS Quadrangle
Date Sampled: 05/13/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Ephemerellidae	1	39
Nemouridae	2	25
Elmidae	4	11
Chironomidae	6	7
Naididae	7	5
Baetidae	4	4
Perlodidae	2	4
Perlidae	1	3
BloodRed Chironomidae	8	1
Sphaeriidae	8	1

Statistical Analysis

Number of Taxa: 10
Total Number of Individuals: 100
% Contribution of Dominant Family: 39.00 % (Ephemerellidae)
Family Biotic Index: 2.53
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 5
% EPT: 75.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 179 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 7.0 / <1 - 1.5 '
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees, shrubs, grass/Fair
Canopy: Partly Open....Other: Water temp. 11.8 C /pH 7.9 SU /DO 8.7 mg/L /Cond 233 umhos; Rural / forested.
Some filamentous algae in deeper, slow moving pools;

Station: AN0103
Airport Branch Of Jacobs Creek, Rt 579, Hopewell Twp, Mercer County
Pennington USGS Quadrangle
Date Sampled: 05/13/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Naididae	7	27
Chironomidae	6	16
Asellidae	8	14
Baetidae	4	10
Nemouridae	2	8
Perlodidae	2	5
Psephenidae	4	5
Perlidae	1	4
Elmidae	4	3
Philopotamidae	3	2
BloodRed Chironomidae	8	2
Dytiscidae	5	1
Lumbriculidae	8	1
Sphaeriidae	8	1
Tetrastemmatidae	7	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 27.00 % (Naididae)
Family Biotic Index: 5.49
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 5
% EPT: 29.00
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 190 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 20 ' / < 1.0 - 1.5 '
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees, shrubs, grasses/Good
Canopy: Mostly Open....Other: Water temp. 13.5 C /pH 7.8 SU /DO 6.2 mg/L /Cond 570 umhos; Suburban / forested
Storm drains and filamentous algae observed;

Station: AN0104
Woolseys Brook, Rt 546, Hopewell Twp, Mercer County
Pennington USGS Quadrangle
Date Sampled: 05/13/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Asellidae	8	52
Chironomidae	6	27
Gammaridae	4	9
Tubificidae	10	3
Nemouridae	2	2
Naididae	7	2
Elmidae	4	1
Perlodidae	2	1
Nematoda	6	1
Perlidae	1	1
BloodRed Chironomidae	8	1

Statistical Analysis

Number of Taxa: 11
Total Number of Individuals: 100
% Contribution of Dominant Family: 52.00 % (Asellidae)
Family Biotic Index: 6.83
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 4.00
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 130 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Slow....Width/Depth (ft): 19 ' / <1.0 - 2 '
Substrate: Cobbles, gravel, silt....StreamBank Vegetation/Stability: Trees, shrubs, grasses/Fair
Canopy: Mostly Open....Other: Water temp. 12.9 C /pH 7.6 SU /DO 9.1 mg/L /Cond 447 umhos; Suburban
Storm sewers and filamentous algae observed. Much silt in stream. ;

Station: AN0105
Jacobs Creek, Rt 546, Hopewell Twp, Mercer County
Pennington USGS Quadrangle
Date Sampled: 05/13/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Perlidae	1	16
Naididae	7	14
Nemouridae	2	12
Chironomidae	6	12
Leptophlebiidae	2	11
BloodRed Chironomidae	8	8
Dytiscidae	5	6
Tubificidae	10	4
Baetidae	4	4
Ephemerellidae	1	3
Elmidae	4	3
Gammaridae	4	2
Hydrophilidae	5	1
Enchytraeidae	10	1
Heptageniidae	4	1
Perlodidae	2	1
Simuliidae	6	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 100
% Contribution of Dominant Family: 16.00 % (Perlidae)
Family Biotic Index: 4.32
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 48.00
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 165 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Slightly Turbid....Flow: Slow....Width/Depth (ft): 38 ' / < 1.0 - 2 '
Substrate: Cobbles, mud....StreamBank Vegetation/Stability: Grasses, trees, shrubs/Fair
Canopy: Mostly Open....Other: Water temp. 12.9 C /pH 7.8 SU /DO 7.2 mg/L /Cond 349 umhos; Suburban / forested
Storm sewers observed;

Station: AN0106
Jacobs Creek, Rt 29, Hopewell Twp, Mercer County
Pennington USGS Quadrangle
Date Sampled: 06/03/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	35
Gammaridae	4	13
Perlidae	1	13
Naididae	7	12
Baetidae	4	6
BloodRed Chironomidae	8	6
Caenidae	7	5
Heptageniidae	4	5
Asellidae	8	3
Lumbriculidae	8	2
Sphaeriidae	8	2
Nemouridae	2	1
Limnephilidae	4	1
Tubificidae	10	1
Collembola	10	1
Dytiscidae	5	1
Tetrastemmatidae	7	1
Elmidae	4	1

Statistical Analysis

Number of Taxa: 18
Total Number of Individuals: 109
% Contribution of Dominant Family: 32.11 % (Chironomidae)
Family Biotic Index: 5.36
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 28.44
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 176 (Optimal) EPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Slightly Turbid....Flow: Moderate....Width/Depth (ft): 28 ' / 1 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Mostly Closed....Other: Water temp. 15.2 C /pH 7.7 SU /DO 9.9 mg/L /Cond 521 umhos; Rural /forested

Station: AN0107
Gold Run, Rt 29 & Lower Ferry Rd, Ewing Twp, Mercer County
Pennington USGS Quadrangle
Date Sampled: 05/13/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	31
Naididae	7	22
Asellidae	8	21
Chironomidae	6	16
Psephenidae	4	5
Elmidae	4	4
Baetidae	4	1
Planariidae	4	1
Hydroptilidae	4	1
Simuliidae	6	1
Tubificidae	10	1

Statistical Analysis

Number of Taxa: 11
Total Number of Individuals: 104
% Contribution of Dominant Family: 29.81 % (Gammaridae)
Family Biotic Index: 5.83
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 1.92
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 151 (Suboptimal) EPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 8 ' / < 1.0 - 1.5 '
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees, shrubs, grasses/Good
Canopy: Mostly Closed....Other: Water temp. 14.2 C /pH 7.7 C /DO 8.9 mg/L /Cond 410 umhos; Suburban
Right bank channelized;

Station: AN0108
Assunpink Creek, Off Rt 571 Roosevelt Rd (S. Rochdale Rd), Roosevelt Boro, Monmouth County
Roosevelt USGS Quadrangle
Date Sampled: 05/15/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Tubificidae	10	30
Chironomidae	6	23
Asellidae	8	12
Enchytraeidae	10	9
BloodRed Chironomidae	8	9
Sphaeriidae	8	7
Stratiomyidae	10	3
Ceratopogonidae	6	2
Tipulidae	3	2
Simuliidae	6	1
Lumbriculidae	8	1
Naididae	7	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 30.00 % (Tubificidae)
Family Biotic Index: 8.21
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 0
% EPT: 0.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 144 (Suboptimal) EPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 5 ' / < 1.0 '
Substrate: Gravel/sand, mud, silt....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Closed....Other: Water temp. 13.2 C /pH 6.6 SU /DO 8.8 mg/L /Cond 89 umhos;
Rural / forested
Filamentous algae, orange flock, frogs and macrophytes observed;

Station: AN0109
Assunpink Creek, Rt 535 Old Trenton Rd, West Windsor Twp, Mercer County
Hightstown USGS Quadrangle
Date Sampled: 05/15/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	44
Naididae	7	23
Gammaridae	4	10
Asellidae	8	5
BloodRed Chironomidae	8	4
Elmidae	4	4
Heptageniidae	4	4
Tubificidae	10	2
Simuliidae	6	2
Hydropsychidae	4	1
Coenagrionidae	9	1

Statistical Analysis

Number of Taxa: 11
Total Number of Individuals: 100
% Contribution of Dominant Family: 44.00 % (Chironomidae)
Family Biotic Index: 6.14
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 5.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 160 (Optimal) EPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Turbid....Flow: Moderate....Width/Depth (ft): 30 ' / 2 '
Substrate: Sand, mud, silt....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Closed....Other: Water temp. 14.1 C /pH 6.6 SU /DO 8.0 mg/L /Cond 160 umhos; Rural / forested
Storm sewers observed. Trout stocked stream;

Station: AN0109A
Assunpink Ck, Windsor Rd, Washington Twp, Mercer County
Allentown USGS Quadrangle
Date Sampled: 05/15/03

Family	Family Tolerance Value (FTV)	Number of Individuals
BloodRed Chironomidae	8	36
Chironomidae	6	24
Tubificidae	10	17
Naididae	7	15
Sphaeriidae	8	8
Asellidae	8	1
Gammaridae	4	1
Planorbidae	6	1

Statistical Analysis

Number of Taxa: 8
Total Number of Individuals: 103
% Contribution of Dominant Family: 34.95 % (BloodRed Chironomidae)
Family Biotic Index: 7.66
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 0
% EPT: 0.00
NJIS Rating: 9
Biological Condition: Moderately Impaired
Habitat Analysis: 156 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Slightly Turbid, gray color....Flow: Moderate....Width/Depth (ft): 25 ' / 3 '
Substrate: Sand, mud, silt....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Closed....Other: Water temp. 13.1 C /pH 6.4 SU /DO 8.1 mg/L /Cond 158 umhos; Rural / forested
Macrophytes observed;

Station: AN0109B
New Sharon Branch, Sharon Rd, Washington Twp, Mercer County
Allentown USGS Quadrangle
Date Sampled: 05/15/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	42
Gammaridae	4	18
Asellidae	8	15
BloodRed Chironomidae	8	13
Naididae	7	6
Elmidae	4	2
Ephemerellidae	1	2
Physidae	7	2
Planariidae	4	1
Erpobdellidae	8	1
Tubificidae	10	1
Nematoda	6	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 104
% Contribution of Dominant Family: 40.38 % (Chironomidae)
Family Biotic Index: 6.17
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 1.92
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 152 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Slightly Turbid, gray color....Flow: Moderate....Width/Depth (ft): 15 ' / 3 '
Substrate: Sand, mud, silt....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Closed....Other: Water temp. 13.2 C /pH 6.7 SU /DO 8.3 mg/L /Cond 182 umhos; Rural / forested
Macrophytes observed;

Station: AN0110
Unt To Shipetaukin Ck, Van Kirk Rd, Lawrence Twp, Mercer County
Princeton USGS Quadrangle
Date Sampled: 06/03/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Physidae	7	37
Asellidae	8	11
Naididae	7	11
Gammaridae	4	9
Chironomidae	6	6
Tubificidae	10	5
BloodRed Chironomidae	8	5
Sphaeriidae	8	4
Dytiscidae	5	3
Lumbricidae	10	2
Lymnaeidae	6	2
Elmidae	4	2
Baetidae	4	1
Glossiphoniidae	8	1
Haliplidae	5	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 37.00 % (Physidae)
Family Biotic Index: 6.90
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 1.00
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 192 (Optimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Slightly Turbid....Flow: Moderate....Width/Depth (ft): 4 ' / < 1.0 - 1.5 '
Substrate: Cobbles, boulders....StreamBank Vegetation/Stability: Shrubs, trees, grass/Good
Canopy: Partly Open....Other: Water temp. 13.6 C /pH 7.2 SU /DO 8.9 mg/L /Cond 211 umhos; Rural / Agriculture-cropland
Macrophytes observed;

Station: AN0111
Shipetaukin Ck, Rt 583 (Princeton Pike), Lawrence Twp, Mercer County
Princeton USGS Quadrangle
Date Sampled: 06/03/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	22
Asellidae	8	19
Gammaridae	4	18
Coenagrionidae	9	8
Hydrobiidae	8	7
BloodRed Chironomidae	8	6
Physidae	7	6
Corixidae	9	4
Tubificidae	10	4
Elmidae	4	2
Ephemerellidae	1	1
Haliplidae	5	1
Naididae	7	1
Heptageniidae	4	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 100
% Contribution of Dominant Family: 22.00 % (Chironomidae)
Family Biotic Index: 6.75
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 2.00
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 139 (Suboptimal) EPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Turbid....Flow: Moderate....Width/Depth (ft): 37 ' / 3 '
Substrate: Silt....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Mostly Closed....Other: Water temp. 14.1 C /pH 7.1 SU /DO 8.5 mg/L /Cond 368 umhos; Suburban

Station: AN0112
Little Shabakunk Creek, Princeton Pike (Rt 583), Lawrence Twp, Mercer County
Princeton USGS Quadrangle
Date Sampled: 06/03/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	27
Naididae	7	23
Tubificidae	10	18
BloodRed Chironomidae	8	11
Gammaridae	4	8
Asellidae	8	7
Elmidae	4	2
Dytiscidae	5	2
Physidae	7	2

Statistical Analysis

Number of Taxa: 9
Total Number of Individuals: 100
% Contribution of Dominant Family: 27.00 % (Chironomidae)
Family Biotic Index: 7.11
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 0
% EPT: 0.00
NJIS Rating: 9
Biological Condition: Moderately Impaired
Habitat Analysis: 128 (Suboptimal) EPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Turbid....Flow: Slow....Width/Depth (ft): 20 ' / 2 - 2.5 '
Substrate: Gravel/sand, silt....StreamBank Vegetation/Stability: Trees, grass/Poor
Canopy: Partly Open....Other: Water temp. 15.8 C /pH 7.2 SU /DO 7.1 mg/L /Cond 242 umhos; Suburban
Tadpoles observed;

Station: AN0113
Shabakunk Creek, Bull Run Rd, Ewing Twp, Mercer County
Pennington USGS Quadrangle
Date Sampled: 05/13/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	39
Asellidae	8	13
BloodRed Chironomidae	8	12
Naididae	7	9
Tubificidae	10	8
Psephenidae	4	7
Elmidae	4	6
Gammaridae	4	2
Caenidae	7	1
Hydroptilidae	4	1
Leptoceridae	4	1
Heptageniidae	4	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 39.00 % (Chironomidae)
Family Biotic Index: 6.56
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 4.00
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 151 (Suboptimal) EPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Slightly Turbid....Flow: Slow....Width/Depth (ft): 20 ' / 2 - 3 '
Substrate: Cobbles, mud....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Mostly Closed....Other: Water temp. 13.3 C /pH 7.7 SU /DO 7.2 mg/L /Cond 550 umhos; Suburban / adjacent to open fields
Storm sewers and turtles observed.; School athletic field drains into stream via ditch.

Station: AN0114
Shabakunk Creek, Rt 206, Lawrence Twp, Mercer County
Pennington USGS Quadrangle
Date Sampled: 05/13/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Naididae	7	57
Tubificidae	10	21
Chironomidae	6	15
BloodRed Chironomidae	8	3
Planariidae	4	2
Plagiostomidae	4	2
Dytiscidae	5	1

Statistical Analysis

Number of Taxa: 7
Total Number of Individuals: 101
% Contribution of Dominant Family: 56.44 % (Naididae)
Family Biotic Index: 7.37
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 0
% EPT: 0.00
NJIS Rating: 6
Biological Condition: Severely Impaired
Habitat Analysis: 100 (Marginal) USEPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 40 ' / 2 - 3 '
Substrate: Silt....StreamBank Vegetation/Stability: Trees, shrubs, grass/Fair
Canopy: Partly Open....Other: Water temp. 13.7 C /pH 7.4 SU /DO 7.4 mg/L /Cond 470 umhos; Suburban. Adjacent to Westgate Apts. swimming pool.
Fish and flowing storm sewer observed.;

Station: AN0115
Miry Run, Rt 533 (Quakerbridge Rd), Hamilton Twp, Mercer County
Trenton East USGS Quadrangle
Date Sampled: 05/15/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	39
Tubificidae	10	18
Sphaeriidae	8	18
Naididae	7	9
Chironomidae	6	6
Asellidae	8	4
BloodRed Chironomidae	8	3
Lumbriculidae	8	1
Dytiscidae	5	1
Psychodidae	10	1

Statistical Analysis

Number of Taxa: 10
Total Number of Individuals: 100
% Contribution of Dominant Family: 39.00 % (Gammaridae)
Family Biotic Index: 6.58
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 0
% EPT: 0.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 140 (Suboptimal) EPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 25 ' < 1.0 '
Substrate: Gravel/sand, silt....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Mostly Closed....Other: Water temp. 14.0 C /pH 6.6 SU /DO 6.3 mg/L /Cond 260 umhos; Suburban. Grocery parking lot on right bank, gas station on left.
Orange flock and storm sewers observed;

Station: AN0115A
Miry Run, Pond Rd, Washington Twp, Mercer County
Trenton East USGS Quadrangle
Date Sampled: 05/15/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	57
BloodRed Chironomidae	8	16
Hydrobiidae	8	10
Elmidae	4	6
Coenagrionidae	9	6
Tubificidae	10	5
Gammaridae	4	4
Leptoceridae	4	2
Sphaeriidae	8	2
Culicidae	8	1
Physidae	7	1

Statistical Analysis

Number of Taxa: 11
Total Number of Individuals: 110
% Contribution of Dominant Family: 51.82 % (Chironomidae)
Family Biotic Index: 6.66
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 1.82
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 153 (Suboptimal) EPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Slightly Turbid....Flow: Slow....Width/Depth (ft): 18 ' / 3 '
Substrate: Gravel/sand, silt....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Closed....Other: Water temp. 14.3 C /pH 7.1 SU /DO 9.4 mg/L /Cond 311 umhos; Suburban
School construction, downstream right bank.; Storm sewer and macrophytes observed

Station: AN0116
Assunpink Creek, Mulberry St, Trenton, Mercer County
Trenton East USGS Quadrangle
Date Sampled: 06/03/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	57
Naididae	8	14
Chironomidae	6	11
BloodRed Chironomidae	8	4
Elmidae	4	3
Hydropsychidae	4	2
Sabellidae	6	2
Physidae	7	2
Corbiculidae	8	1
Plagiostomidae	4	1
Tubificidae	10	1
Planorbidae	6	1
Simuliidae	6	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 100
% Contribution of Dominant Family: 57.00 % (Gammaridae)
Family Biotic Index: 5.18
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 2.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 157 (Suboptimal) EPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Turbid....Flow: Fast....Width/Depth (ft): 30 ' / 1 - 3 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs, grass/Fair
Canopy: Mostly Open....Other: Water temp. 17.7 C /pH 7.0 SU /DO 8.0 mg/L /Cond 223 umhos; Urban / industrial
Much garbage in stream and on banks. Goose droppings; Macrophytes

Station: AN0117
Pond Run, Rt 533 (Whitehorse-Mercerville Rd), Hamilton Twp, Mercer County
Trenton East USGS Quadrangle
Date Sampled: 06/03/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Tubificidae	10	43
Asellidae	8	15
Physidae	7	13
Sphaeriidae	8	8
Hydridae	5	7
Lumbriculidae	10	6
Glossiphoniidae	8	3
BloodRed Chironomidae	8	1
Erpobdellidae	8	1
Lumbricidae	10	1
Naididae	7	1
Chironomidae	6	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 100
% Contribution of Dominant Family: 43.00 % (Tubificidae)
Family Biotic Index: 8.63
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 0
% EPT: 0.00
NJIS Rating: 9
Biological Condition: Moderately Impaired
Habitat Analysis: 141 (Suboptimal) EPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Turbid....Flow: Slow....Width/Depth (ft): 10 ' / < 1.0 - 1.5 '
Substrate: Silt....StreamBank Vegetation/Stability: Shrubs, trees, grass/Poor
Canopy: Mostly Closed....Other: Water temp. 16.5 C /pH 6.7 SU /DO 6.5 mg/L /Cond 181 umhos; Suburban / forested
Storm sewers, many mosquitos ;

Station: AN0118
Assunpink Ck, Willow St, Trenton, Mercer County
Trenton West USGS Quadrangle
Date Sampled: 06/03/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	32
Tubificidae	10	30
Sphaeriidae	8	10
Chironomidae	6	8
Naididae	7	7
Enchytraeidae	10	4
BloodRed Chironomidae	8	4
Hydrobiidae	8	3
Hydropsychidae	4	3
Asellidae	8	2
Collembola	10	1
Corixidae	9	1
Dolichopodidae	4	1
Lumbriculidae	8	1
Tipulidae	3	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 108
% Contribution of Dominant Family: 29.63 % (Gammaridae)
Family Biotic Index: 7.06
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 2.78
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 122 (Suboptimal) EPA Protocol
Deficiency(s) noted:
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Turbid....Flow: Moderate....Width/Depth (ft): 50 ' / 3 '
Substrate: Cobbles, silt....StreamBank Vegetation/Stability: Trees, shrubs, grass/Fair
Canopy: Mostly Open....Other: Water temp. 16.0 C /pH 7.3 SU /DO 8.6 mg/L /Cond 210 umhos; Urban
Storm sewers, fish and ducks observed;

Station: AN0294
Lake Lookout Bk (Trib To Wawayanda Ck), Wawayanda Rd, Wawayanda St. Pk., Sussex County
Wawayanda USGS Quadrangle
Date Sampled: 05/07/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Baetidae	4	35
Chironomidae	6	15
Hydropsychidae	4	9
Simuliidae	6	9
Sphaeriidae	8	7
Naididae	7	5
Gammaridae	4	4
Lumbriculidae	8	4
Philopotamidae	3	3
Empididae	6	3
Tetrastemmatidae	7	3
Elmidae	4	3
Nemouridae	2	2
Asellidae	8	2
Glossosomatidae	0	1
Tipulidae	3	1
BloodRed Chironomidae	8	1
Heptageniidae	4	1

Statistical Analysis

Number of Taxa: 18
Total Number of Individuals: 108
% Contribution of Dominant Family: 32.41 % (Baetidae)
Family Biotic Index: 5.13
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 47.22
NJIS Rating: 27
Biological Condition: Nonimpaired
Habitat Analysis: 162 (Optimal) EPA Protocol II
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 20/1
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees/ Weeds/Fair
Canopy: Open....Other: Water Temp 16.6C / pH 8.5SU / DO 9.7mg/L / Cond 174umhos;
Forested/ Storm Sewers/ Drought Emergecy
Banks stabilized with cobbles;

Station: AN0295
Wawayanda Ck (Pochuck Ck), Canal Rd, Vernon Twp, Sussex County
Wawayanda USGS Quadrangle
Date Sampled: 4/2/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	45
Gammaridae	4	36
Simuliidae	6	6
Siphlonuridae	7	5
Nemouridae	2	3
Taeniopterygidae	2	2
Elmidae	4	1
Asellidae	8	1
Hydropsychidae	4	1
Planariidae	4	1
Lumbriculidae	8	1
Leptoceridae	4	1
Heptageniidae	4	1
Tabanidae	6	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 105
% Contribution of Dominant Family: 42.86 % (Chironomidae)
Family Biotic Index: 5.11
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 6
% EPT: 12.38
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 86 (Marginal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Slightly Turbid....Flow: Moderate....Width/Depth (ft): 20 / 2.5 -5.0 '
Substrate: Mud, silt....StreamBank Vegetation/Stability: Grasses, shrubs/Poor
Canopy: Partly Open....Other: Water temp. 5.0 C /pH 8.0 SU /DO 14.0 mg/L /Cond 288 umhos; Rural / forested. Substrate mud and silt w/ few root mats.

Station: AN0296
Black Ck, Marker Rd (Maple Grange Rd), Vernon Twp, Sussex County
Wawayanda USGS Quadrangle
Date Sampled: 4/2/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	52
Chironomidae	6	20
Enchytraeidae	10	9
Siphlonuridae	7	4
Physidae	7	4
Lymnaeidae	6	3
Tubificidae	10	3
Corixidae	9	2
Coenagrionidae	9	2
Nemouridae	2	2
Sphaeriidae	8	2
Simuliidae	6	2
Baetidae	4	1
Planariidae	4	1
Limnephilidae	4	1
BloodRed Chironomidae	8	1
Valvatidae	4	1

Statistical Analysis

Number of Taxa: 17
Total Number of Individuals: 110
% Contribution of Dominant Family: 47.27 % (Gammaridae)
Family Biotic Index: 5.58
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 4
% EPT: 7.27
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 134 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 40 / 2-4 '
Substrate: Mud, silt....StreamBank Vegetation/Stability: Trees, shrubs, grass/Fair
Canopy: Partly Open....Other: Water temp. 5.5 C /pH 7.9 SU /DO 13.6 mg/L /Cond 499 umhos; Rural. Storm sewers

Station: AN0297
Wallkill River, Rt 15, Sparta Twp, Sussex County
Newton East USGS Quadrangle
Date Sampled: 4/3/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	27
Elmidae	4	25
Gammaridae	4	17
Tipulidae	3	4
Hydropsychidae	4	4
Naididae	7	4
Planariidae	4	3
Planorbidae	6	3
Asellidae	8	2
Empididae	6	2
Enchytraeidae	10	2
Ephemerellidae	1	2
Sphaeriidae	8	2
Psephenidae	4	2
BloodRed Chironomidae	8	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 27.00 % (Chironomidae)
Family Biotic Index: 4.98
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 6.00
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 191 (Optimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 13 / 1-2 '
Substrate: Cobbles, gravel....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Closed....Other: Water temp. 9.3 C /pH 8.5 SU /DO 11.8 mg/L /Cond 616 umhos; Suburban / forested

Station: AN0298
Wallkill River, Kennedy Ave, Ogdensburg Boro, Sussex County
Franklin USGS Quadrangle
Date Sampled: 04/03/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	31
Chironomidae	6	21
Sphaeriidae	8	11
Elmidae	4	10
Hydropsychidae	4	8
Tipulidae	3	6
Simuliidae	6	6
Empididae	6	5
Limnephilidae	4	4
Siphlonuridae	7	1
Gomphidae	1	1
Tubificidae	10	1
Taeniopterygidae	2	1
Nemouridae	2	1
BloodRed Chironomidae	8	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 108
% Contribution of Dominant Family: 28.70 % (Gammaridae)
Family Biotic Index: 5.00
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 5
% EPT: 13.89
NJIS Rating: 21
Biological Condition: Moderately Impaired
Habitat Analysis: 179 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 23 ' / 2.5 - 3.0 '
Substrate: Cobbles, gravel/sand, silt....StreamBank Vegetation/Stability: Trees, grass/Fair
Canopy: Partly Open....Other: Water temp. 8.2 C /pH 8.2 SU /DO 11.6 mg/L /Cond 500 umhos; Rural, forested. Storm sewers observed.
New bridge;

Station: AN0299
Wallkill River, Scott Rd, Franklin Boro, Sussex County
Hamburg USGS Quadrangle
Date Sampled: 4/3/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	39
Gammaridae	4	26
Hydropsychidae	4	16
Elmidae	4	6
Philopotamidae	3	4
Planariidae	4	3
Simuliidae	6	3
Tipulidae	3	2
Empididae	6	2
BloodRed Chironomidae	8	2
Psephenidae	4	2
Capniidae	1	1
Sphaeriidae	8	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 107
% Contribution of Dominant Family: 36.45 % (Chironomidae)
Family Biotic Index: 4.85
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 19.63
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 190 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 40 / 2.5 '
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Open....Other: Water temp. 9.0 C /pH 8.3 SU /DO 11.7 mg/L /Cond 455 umhos; Rural / agriculture (livestock). Storm sewer pipe present.

Station: AN0300
Wallkill River, Rt 94, Hamburg Boro, Sussex County
Hamburg USGS Quadrangle
Date Sampled: 04/10/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	30
Gammaridae	4	23
Elmidae	4	10
Empididae	6	9
Hydropsychidae	4	4
Philopotamidae	3	3
Naididae	7	3
BloodRed Chironomidae	8	3
Psephenidae	4	3
Tubificidae	10	2
Limnephilidae	4	2
Nemouridae	2	1
Asellidae	8	1
Planariidae	4	1
Lumbriculidae	8	1
Glossosomatidae	0	1
Erpobdellidae	8	1
Ephemerellidae	1	1
Taeniopterygidae	2	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 100
% Contribution of Dominant Family: 30.00 % (Chironomidae)
Family Biotic Index: 5.09
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 7
% EPT: 13.00
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 138 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 32 ' / 3 '
Substrate: Gravel/sand, silt....StreamBank Vegetation/Stability: Trees, shrubs/Fair
Canopy: Mostly Open....Other: Water temp. 5.0 C /pH 8.6 SU /DO 13.5 mg/L /Cond 472 umhos; Suburban, state park boundary. Periphyton observed
Ames Rubber Corp & MUA upstream dischargers;

Station: AN0301
Beaver Run, Cemetary Rd Off Pond School Rd, Wantage Twp., Sussex County
Hamburg USGS Quadrangle
Date Sampled: 04/10/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	35
Hydropsychidae	4	19
BloodRed Chironomidae	8	10
Asellidae	8	7
Glossiphoniidae	8	5
Tubificidae	10	4
Physidae	7	4
Elmidae	4	4
Planorbidae	6	3
Naididae	7	3
Simuliidae	6	3
Erpobdellidae	8	1
Empididae	6	1
Psephenidae	4	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 100
% Contribution of Dominant Family: 35.00 % (Chironomidae)
Family Biotic Index: 6.21
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 1
% EPT: 19.00
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 131 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 14 ' / 1 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Grasses, trees/Fair
Canopy: Open....Other: Water temp. 6.3 C /pH 8.6 SU /DO 13.7 mg/L /Cond 455 umhos;
Suburban, agriculture-livestock (llama farm).
Periphyton, macrophytes, filamentous algae observed;

Station: AN0302
Wallkill River, Rt 565 (Glenwood Rd), Wantage Twp., Sussex County
Hamburg USGS Quadrangle
Date Sampled: 04/10/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Gammaridae	4	60
Chironomidae	6	14
Asellidae	8	6
Tubificidae	10	6
Elmidae	4	3
Hydropsychidae	4	2
Enchytraeidae	10	2
Sphaeriidae	8	2
BloodRed Chironomidae	8	1
Planariidae	4	1
Ancylidae	6	1
Hydroptilidae	4	1
Psephenidae	4	1

Statistical Analysis

Number of Taxa: 13
Total Number of Individuals: 100
% Contribution of Dominant Family: 60.00 % (Gammaridae)
Family Biotic Index: 5.14
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 3.00
NJIS Rating: 12
Biological Condition: Moderately Impaired
Habitat Analysis: 145 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 44 ' / 3 '
Substrate: Cobbles, gravel/sand, silt....StreamBank Vegetation/Stability: Grasses, trees/Fair
Canopy: Open....Other: Water temp. 5.6 C /pH 8.5 SU /DO 14.0 mg/L /Cond 490 umhos; Rural, Wallkill National Wildlife refuge
Macrophytes, beaver dam upstream of bridge;

Station: AN0303
Papakating Ck, Rt 629 (Wykertown Rd) & Gunn Rd, Frankford Twp, Sussex County
Branchville USGS Quadrangle
Date Sampled: 04/15/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	55
Nemouridae	2	13
Simuliidae	6	7
BloodRed Chironomidae	8	5
Perlidae	1	4
Heptageniidae	4	4
Limnephilidae	4	3
Elmidae	4	3
Leptophlebiidae	2	2
Glossosomatidae	0	1
Philopotamidae	3	1
Empididae	6	1
Hydropsychidae	4	1
Lumbricidae	10	1
Psephenidae	4	1
Ephemerellidae	1	1

Statistical Analysis

Number of Taxa: 16
Total Number of Individuals: 103
% Contribution of Dominant Family: 53.40 % (Chironomidae)
Family Biotic Index: 4.99
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 9
% EPT: 29.13
NJIS Rating: 24
Biological Condition: Nonimpaired
Habitat Analysis: 182 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 9 ' / 1 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Closed....Other: Water temp. 12.7 C /pH 7.4 SU /DO 11.6 mg/L /Cond 232;
Agriculture-livestock, rural. Storm sewer present
Salamanders, periphyton, filamentous algae observed;

Station: AN0304
Papakating Ck, Rt 565 & Pelltown Rd, Frankford Twp, Sussex County
Branchville USGS Quadrangle
Date Sampled: 04/15/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	32
Tubificidae	10	22
Gammaridae	4	20
BloodRed Chironomidae	8	10
Caenidae	7	6
Elmidae	4	4
Ancylidae	6	3
Heptageniidae	4	2
Sphaeriidae	8	2
Collembola	10	1
Glossiphoniidae	8	1
Polycentropodidae	6	1
Psephenidae	4	1
Tabanidae	6	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 106
% Contribution of Dominant Family: 30.19 % (Chironomidae)
Family Biotic Index: 6.66
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 8.49
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 133 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 22 ' / 2.6 '
Substrate: Cobbles, silt....StreamBank Vegetation/Stability: Trees, grass, shrubs/Fair
Canopy: Open....Other: Water temp. 10.0 C /pH 8.1 SU /DO 13.8 mg/L /Cond 233 umhos;
Agriculture - cropland and livestock, rural.
Periphyton, macrophytes and storm sewers observed.;

Station: AN0305
W Br Papakating Ck, Rt 519 & Rt 628, Wantage Twp, Sussex County
Branchville USGS Quadrangle
Date Sampled: 04/15/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	59
Simuliidae	6	14
Elmidae	4	10
Heptageniidae	4	4
Empididae	6	2
Gammaridae	4	2
Perlidae	1	2
Tubificidae	10	1
Philopotamidae	3	1
Perlodidae	2	1
BloodRed Chironomidae	8	1
Psephenidae	4	1
Odontoceridae	0	1
Sphaeriidae	8	1

Statistical Analysis

Number of Taxa: 14
Total Number of Individuals: 100
% Contribution of Dominant Family: 59.00 % (Chironomidae)
Family Biotic Index: 5.51
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 5
% EPT: 9.00
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 166 (Optimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear (grey)....Flow: Fast....Width/Depth (ft): 15 ' / 1 '
Substrate: Cobbles....StreamBank Vegetation/Stability: Trees, shrubs, grass/Good
Canopy: Partly Open....Other: Water temp. 12.7 C /pH 7.7 SU /DO 12.8 mg/L /Cond 219 umhos; Agriculture-livestock, rural.
Periphyton and filamentous algae present; Storm sewers and stone retention walls observed.

Station: AN0306
W Branch Papakating Ck, Rt 565, Wantage Twp, Sussex County
Hamburg USGS Quadrangle
Date Sampled: 04/16/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Elmidae	4	20
Chironomidae	6	13
Limnephilidae	4	12
Perlidae	1	9
Hydropsychidae	4	8
Empididae	6	7
Perlodidae	2	5
Lumbriculidae	8	5
Philopotamidae	3	3
Nemouridae	2	3
Leptophlebiidae	2	3
BloodRed Chironomidae	8	3
Psephenidae	4	3
Enchytraeidae	10	2
Tubificidae	10	2
Baetidae	4	1
Gammaridae	4	1
Glossosomatidae	0	1
Simuliidae	6	1

Statistical Analysis

Number of Taxa: 19
Total Number of Individuals: 102
% Contribution of Dominant Family: 19.61 % (Elmidae)
Family Biotic Index: 4.41
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 9
% EPT: 44.12
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 187 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 22 ' / <1.0 - 1.5 '
Substrate: Cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs, grass/Fair
Canopy: Partly Open....Other: Water temp. 14.0 C /pH 8.6 SU / DO 12.6 mg/L /Cond 339 umhos; Agriculture - livestock, suburban, forested
Trout stocked water;

Station: AN0307
Papakating Ck, Rt 565, Wantage Twp, Sussex County
Hamburg USGS Quadrangle
Date Sampled: 04/22/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	29
Chironomidae	6	23
Tubificidae	10	22
Elmidae	4	6
BloodRed Chironomidae	8	4
Gammaridae	4	4
Simuliidae	6	3
Hydropsychidae	4	2
Tipulidae	3	1
Cambaridae	5	1
Ancylidae	6	1
Psychomyiidae	2	1
Naididae	7	1
Psephenidae	4	1
Heptageniidae	4	1

Statistical Analysis

Number of Taxa: 15
Total Number of Individuals: 100
% Contribution of Dominant Family: 29.00 % (Chironomidae)
Family Biotic Index: 6.61
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 3
% EPT: 4.00
NJIS Rating: 18
Biological Condition: Moderately Impaired
Habitat Analysis: 99 (Marginal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Turbid....Flow: Slow....Width/Depth (ft): 43.0 ' / 2.0 '
Substrate: Mud, silt....StreamBank Vegetation/Stability: Grasses, trees, shrubs/Poor
Canopy: Open....Other: Water temp. 12.1 C /pH 7.8 SU /DO 8.0 mg/L /Cond 315 umhos;
Agriculture-livestock
Fish observed;

Station: AN0308
Unt To Clove Bk, Rose Marrow Ave (Near Rt 651), Wantage Twp, Sussex County
Unionville USGS Quadrangle
Date Sampled: 05/22/02

Family	Family Tolerance Value (FTV)	Number of Individuals
Naididae	7	68
Tubificidae	10	15
Chironomidae	6	6
Asellidae	8	5
Glossiphoniidae	8	3
Dytiscidae	5	1
BloodRed Chironomidae	8	1
Cambaridae	5	1

Statistical Analysis

Number of Taxa: 8
Total Number of Individuals: 100
% Contribution of Dominant Family: 68.00 % (Naididae)
Family Biotic Index: 7.44
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 0
% EPT: 0.00
NJIS Rating: 3
Biological Condition: Severely Impaired
Habitat Analysis: 128 (Suboptimal) USEPA Protocol
Deficiency(s) noted: Naididae Family Overwhelmingly Dominant -
- Significant Organic Pollution - Paucity of Clean Water Organisms -

Observations

Streamwater: Slightly Turbid....Flow: Slow....Width/Depth (ft): 5/<1-2
Substrate: Cobbles/ Gravel/ Sand/ Silt....StreamBank Vegetation/Stability: Grasses/ Shrubs/Fair
Canopy: Open....Other: Water Temp 13.2 C / pH N/A / DO 11.0 mg/L / Cond 206 umhos; Agriculture- cropland/ Rural
Drought emergency/ filamentous algae; Farm upstream recently ploughed, very turbid stream

Station: AN0309
Clove Brook, Loomis Ave, Sussex Boro, Sussex County
Hamburg USGS Quadrangle
Date Sampled: 4/22/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Lumbriculidae	8	28
Chironomidae	6	20
Naididae	7	15
BloodRed Chironomidae	8	12
Elmidae	4	11
Tubificidae	10	9
Physidae	7	3
Hydropsychidae	4	2
Gammaridae	4	2
Simuliidae	6	2
Psephenidae	4	2
Siphlonuridae	7	1

Statistical Analysis

Number of Taxa: 12
Total Number of Individuals: 107
% Contribution of Dominant Family: 26.17 % (Lumbriculidae)
Family Biotic Index: 6.94
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 2
% EPT: 2.80
NJIS Rating: 15
Biological Condition: Moderately Impaired
Habitat Analysis: 142 (Suboptimal) USEPA Protocol
Deficiency(s) noted:
- Paucity of Clean Water Organisms -

Observations

Streamwater: Clear....Flow: Moderate....Width/Depth (ft): 30 ' / < 1-1.5 '
Substrate: Cobbles, gravel....StreamBank Vegetation/Stability: Trees, shrubs, grass/Poor Canopy: Partly Open....Other: Water temp. 14.0 C /pH 8.8 SU /DO 11.2 mg/L /Cond 273 umhos; Urban.
Left bank bulkheaded (adjacent to auto repair shop and farm supply store); Fish and macrophytes observed.

Station: AN0309A
Clove Brook, Unionville Rd, Wantage Twp, Sussex County
Port Jervis South USGS Quadrangle
Date Sampled: 4/22/03

Family	Family Tolerance Value (FTV)	Number of Individuals
Chironomidae	6	31
Ephemerellidae	1	15
Nemouridae	2	12
Baetidae	4	9
Siphlonuridae	7	7
Empididae	6	7
Heptageniidae	4	5
Lumbriculidae	8	4
Leptophlebiidae	2	4
Glossosomatidae	0	2
Perlodidae	2	2
Limnephilidae	4	2
Psephenidae	4	2
Elmidae	4	2
Tipulidae	3	1
Hydropsychidae	4	1
Perlidae	1	1
Sphaeriidae	8	1
Simuliidae	6	1
Rhyacophilidae	0	1

Statistical Analysis

Number of Taxa: 20
Total Number of Individuals: 110
% Contribution of Dominant Family: 28.18 % (Chironomidae)
Family Biotic Index: 4.20
E+P+T (Ephemeroptera, Plecoptera, Trichoptera): 12
% EPT: 55.45
NJIS Rating: 30
Biological Condition: Nonimpaired
Habitat Analysis: 187 (Optimal) USEPA Protocol
Deficiency(s) noted:
-

Observations

Streamwater: Clear....Flow: Fast....Width/Depth (ft): 15 ' / 1-1.5'
Substrate: Bedrock, cobbles, gravel/sand....StreamBank Vegetation/Stability: Trees, shrubs/Good
Canopy: Mostly Closed....Other: Water temp. 11.9 C /pH 8.6 SU /DO 11.0 mg/L /Cond 249 umhos; Agriculture - livestock, rural.
Fish observed. Road gravel in stream;