AMBIENT BIOMONITORING NETWORK

Northeast Water Region
Passaic River Drainages

Watershed Management Areas 3, 4, 5, and 6
Round 4 Benthic Macroinvertebrate Data
Volume 1 of 2

December 2012

NJ Department of Environmental Protection
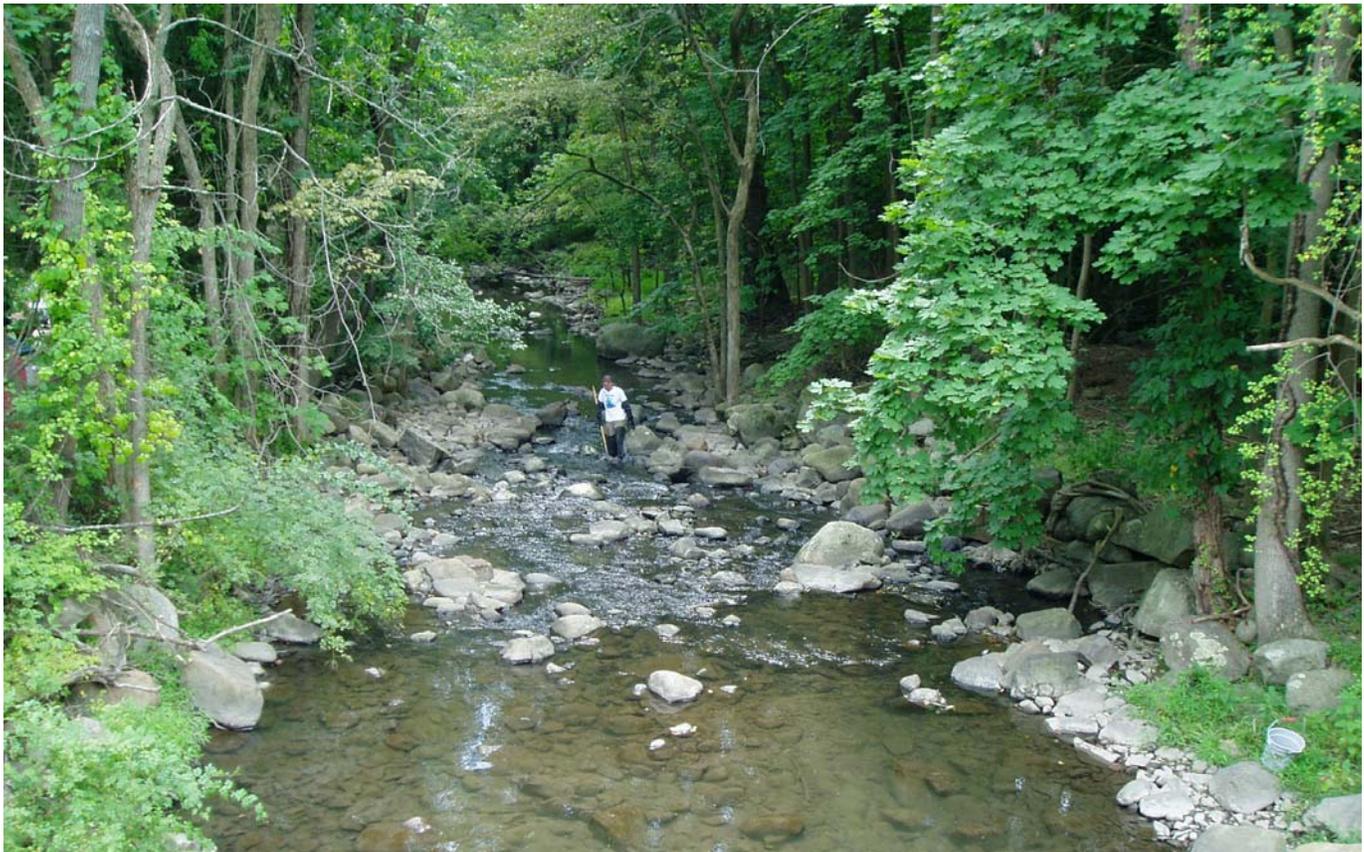
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Bureau of Freshwater & Biological Monitoring
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[cover photo: Site AN0237, Troy Brook at Beverwyck Rd, Morris County, NJ]

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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 760 non-tidal AMNET stations employs sampling and taxonomic analysis of in-stream macroinvertebrate communities to assess the ecological condition at each station. An integrated index of "biometrics", based on community composition and pollution tolerance levels of individual taxa, is used to assign assessment ratings.

Between the start of the program (1992) up until 2004, a single statewide index, the New Jersey Impairment Score (NJIS), was used in assigning one of three assessment ratings, non-impaired, moderately impaired, and severely impaired.   The NJIS was limited in that it used family level taxonomic identification for calculating scores and did not account for geographical differences in macroinvertebrate community structures To resolve these limitations, starting with the mid 2004 data (Atlantic Region report), three indices are used for assessments; High Gradient Macroinvertebrate Index (HGMI), Coastal Plain Macroinvertebrate Index (CPMI), and Pinelands Macroinvertebrate Index (PMI). These indices account for the State's geophysically different ecoregions and use genus level taxonomic identification for calculating scores. The higher level of identification allows for more resolute and accurate results at four assessment rating levels (rather than the three previously used); "excellent", "good", "fair", and "poor". The results are considered reflective of the water and/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 Water Quality Monitoring and Assessment Report.   AMNET data are also integral for designation of Category 1 waters, based on exceptional ecological significance.

Northeast Region - Round 4 Bioassessment Results
(102 total sites)

Poor 23.5%
Excellent 6.9%
Good 18.6%
Fair 51.0%
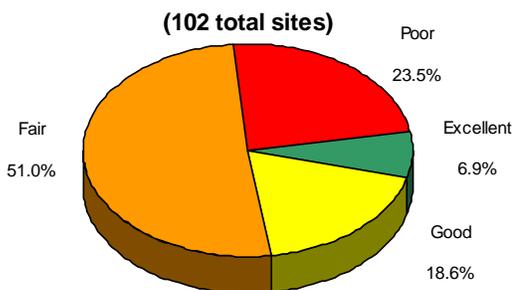
Figure 1

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 153 non-tidal AMNET sites each, are sampled in consecutive years on a five-year rotational basis. The most recent results (posted by the end of the calendar year sampling is completed for a Region), and Round by Round comparisons along with raw data, can be found at:
http://www.state.nj.us/dep/wms/bfbm/amnetRnd4.html

The present study area comprises the Northeast Water Region and includes those sub-basins that drain to the Passaic and Hackensack Rivers. The Northeast Water Region is situated in the northeastern corner of New Jersey. It superimposes largely on the New York/New Jersey Piedmont and Highlands, and a portion of the Reading Prong physiographic subregions, which feature principally high-gradient terrain. This report presents the results for the biological monitoring conducted from July 2008 – November 2008 (see Map 1, page 4). The sampling of the Northeast Water Region marks the fourth round of data collection for this basin. The results obtained in the fourth round are similar to those of the previous (third round) of sampling. Currently, of the 102 AMNET sites sampled in the Northeast Water Region, 7 (6.9%) were found to exhibit "excellent" benthic macroinvertebrate communities, with 19 (18.6%) exhibiting "good", 52 (51.0%) "fair", and 24 (23.5%) exhibiting "poor" benthic communities (See Figure 1).

In order to generate trend information, results from the current (Round 4) sampling were compared to those from the same sites sampled in the earlier round (Round 3). For the purposes of comparing the two rounds, Round 3 results were re-assessed using the new indices. Of the 102 AMNET sites sampled in the Northeast Water Region, the Round 4 samplings yielded sites with more "good" (18.6%) ratings than did the third round sampling (12.7%). Conversely, the number of "excellent" (6.9%), "fair" (51.0%) and "poor" (23.5%) rated sites observed in the Round 4 sampling has declined since the Round 3 sampling (7.8%, 54.9%, and 24.5% respectively). Figure 2 displays the percentage of change in rating among the same 101 AMNET sites in the Northeast Water Region that were sampled during the third round study period, and again during the current (Round 4) study period. The green indicates sites that have undergone a positive change, yellow indicates no change, and red indicates a negative change. Positive change is defined as an improved rating from the previous Round's rating, while a negative change is defined as a downgraded rating from the previous Round. Individual results and changes in each site can be found in Table 4, Volume 2.

Percent Change in Rating Between the Round 3 and the Round 4 Monitoring (101 sites total)

Positive Change 21.8%

No Change 60.4%

Negative Change 17.8%
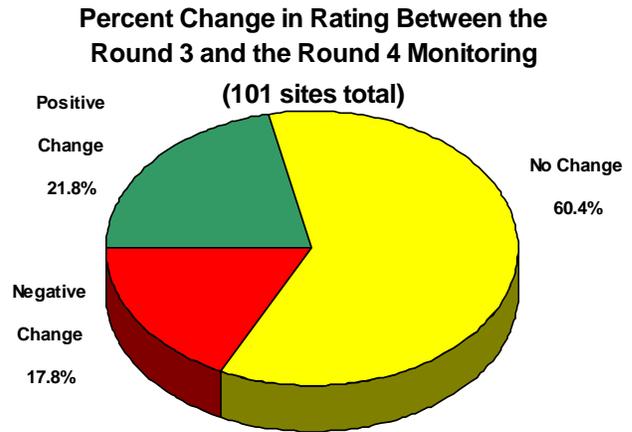
Figure 2

Figure 3 compares the results of each round of sampling in the Northeast Region. The percentage of excellent, good, and severe results remained relatively stable from round 1 to round 4. Earlier rounds of data were recalculated using the new indices. Some sites sampled in Round 1 were collected outside of the April – November sampling period criteria specified for the newly implemented indices. Results from these samples may not have the same degree of accuracy as those collected within the sample period criteria. More robust statistical analysis will be used in the future, if necessary, to compare significant differences between Rounds.

Northeast Basin AMNET Results

Excellent
Good
Fair
Poor

Rnd1 (1989-93) Rnd2 (1998-99) Rnd3 (2003-04) Rnd4 (2008)

AMNET Rounds
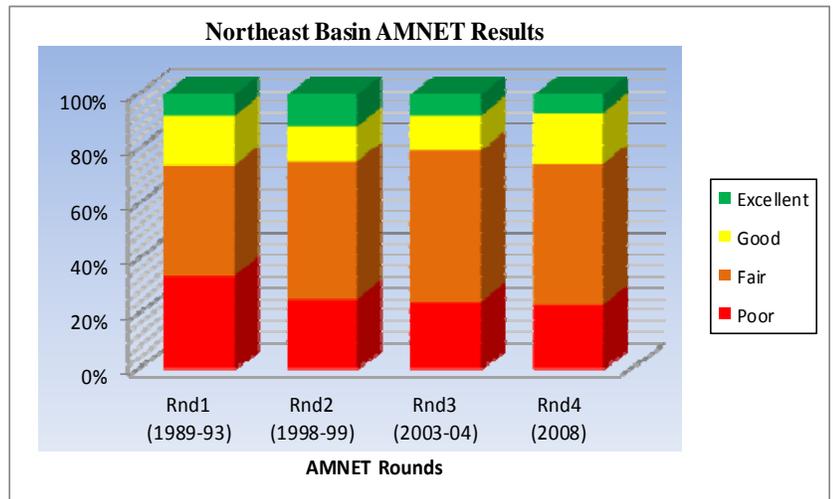
Figure 3

Assessment Rating	Round 1	Round 2	Round 3	Round 4
Excellent	7.8%	11.8%	7.8%	6.9%
Good	21.7%	12.7%	12.7%	18.6%
Fair	33.9%	50.0%	54.9%	51.0%
Poor	36.5%	25.5%	24.5%	23.5%

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 concludes the following:

1) 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.

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 TMDL or other appropriate management measures will be taken to remediate the impairment. Currently, there are no SI studies in this Water Region.

Additional Information

Additional Information on the AMNET program can be obtained from the WM&S' Bureau of Freshwater & Biological Monitoring by calling 609-292-0427 or visiting its website at: http://www.state.nj.us/dep/wms/bfbm

Raw data is posted on this website by the end of the calendar year that the data is received and validated.

Additionally, raw data is submitted to WQX as soon as the data is received and validated. WQX is USEPA's repository and framework for water quality, biological, and physical data. It is used by state environmental agencies, EPA and other federal agencies, universities, private citizens, and many others to store data. The retrieval of the data is handled through the STORET interface and can be accessed at: http://www.epa.gov/storet

Comments are welcome and may be emailed to: bfbm@dep.state.nj.us.

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* 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

Map 1
NORTHEAST WATER REGION

Pompton, Pequannock, Wanaque and Ramapo

Lower Passaic and Saddle

Upper Passaic, Whippany and Rockaway

Hackensack, Hudson and Pascack

AMNET Assessment Categories
- Excellent
- Good
- Fair
- Poor
- Not Sampled

Index

High Gradient Macroinvertebrate Index (HGMI)

Watershed Management Area

0   4.5   9   18 Miles

1 inch equals 5.15 miles
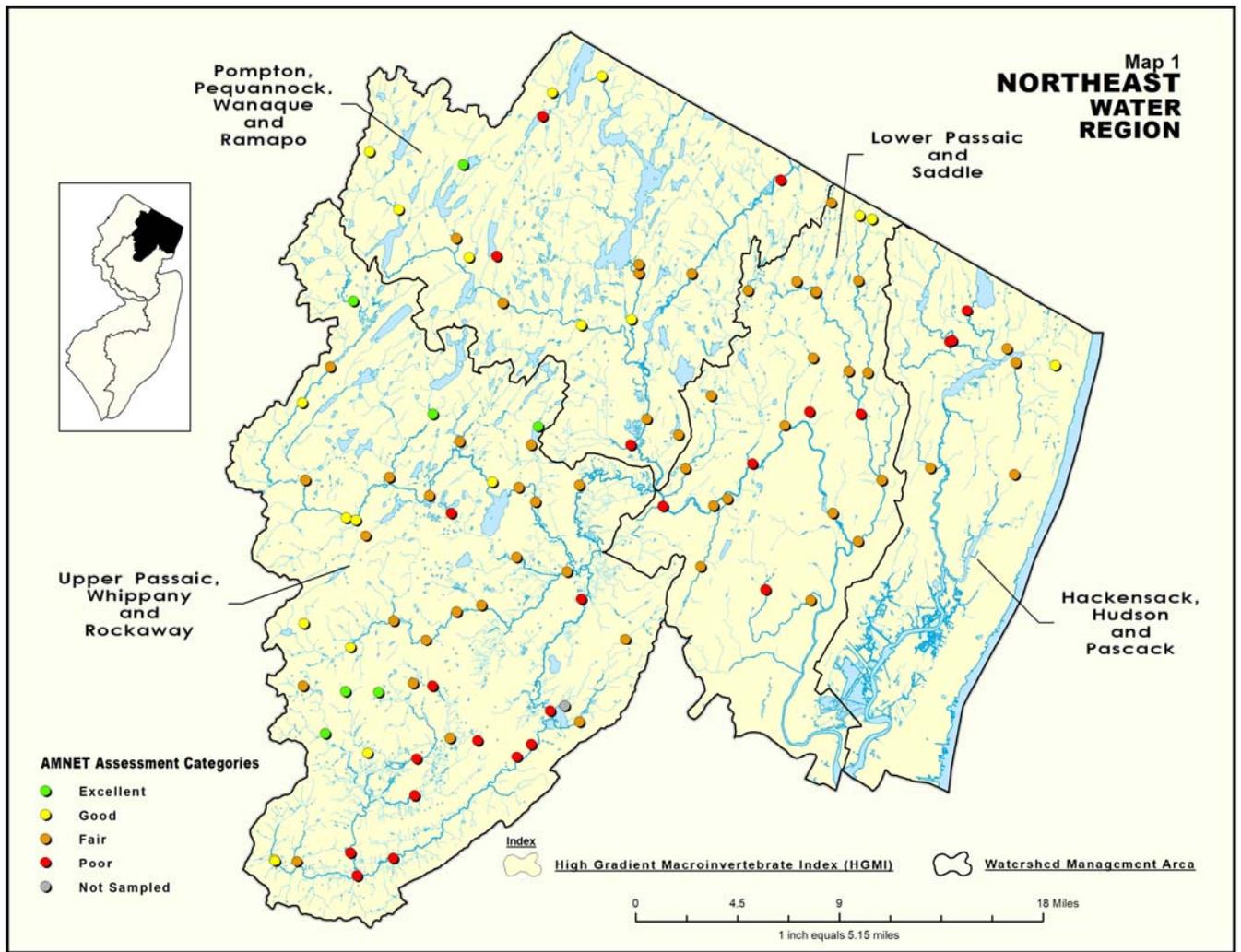
INTRODUCTION

Rationale for Biological Monitoring

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 760 AMNET stations employs sampling and taxonomic analysis of in-stream macroinvertebrate communities to assess the ecological condition at each station. An integrated index of "biometrics", based on community composition and pollution tolerance levels of individual taxa, is used to assign assessment ratings; specifically the High Gradient Macroinvertebrate Index (HGMI). 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.
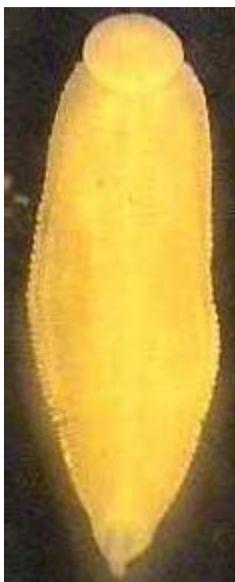
Leeches and other segmented worms are very common in our lakes and streams, though not often noticed. They are tolerant of poor water quality and severe pollution.
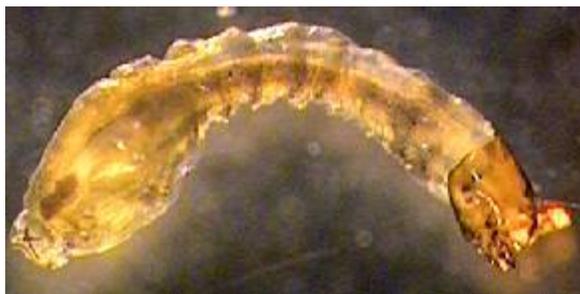
Black fly larvae are filter feeders, capturing and ingesting plankton and bacteria from the surrounding water with specialized antennae. Some species are very tolerant of poor water quality and thus can be used as indicators of pollution.

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 21 WMA's 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 present study area comprises the Northeast Water Region, (see Figure 1) and includes WMA #'s 3 (Pompton, Pequannock, Wanaque, and Ramapo Rivers), 4 (Lower Passaic and Saddle Rivers), 5 (Hackensack River), and 6 (Upper Passaic, Whippany and Rockaway Rivers) (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 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.

The AMNET program is designed to monitor a Water Region's complement of stations within a 12 to 15 month time period (depending on the size of the Water Region) giving DEP's modelers and planners a snapshot of ambient biological impacts during that continuous time interval. Administratively this sampling time interval starts at the beginning of the State's Fiscal Year in July. Sampling continues from that point, but only during the sampling index months of April - November, until all of the sites of the respective Water Region are visited. 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 are situated at least three miles downstream of headwaters (first order streams are those with no tributaries). Since most streams at this level have very little (or only intermittent) flow, most of the AMNET 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 wadeable 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 Northeast Water Region.

To maximize data correlation, AMNET, wherever possible, incorporates existing stations of the Ambient Surface Water Chemical Monitoring Network, which is administered jointly by NJDEP and the USGS [3]. Furthermore, so as to gauge the effects of major tributaries and larger lakes, many AMNET sites are located near their confluence or outlet. An attempt is made when selecting sites to obtain a sample representative of the stream's total water quality. Sites are placed downstream of features such as: known sources of contamination (e.g. point-source discharges, agricultural operations); significant natural features such as wetlands, parks or wildlife management areas when it is determined that these features have a dominant impact (positively or negatively) on the stream.

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 NJDEP's Geographical Information System (GIS) (see Maps 1 – 8, Appendix A, Volume 2).

A total of 104 stations had been established in the Northeast region in the previous round (Round 3) [4]. Since then, one site (AN0293) was determined to be tidal and was dropped from the network. This left a total of 103 active sites the Northeast Water Region. This area (shown in Figure 4) primarily includes WMA #'s 3 (Pompton, Pequannock, Wanaque, and Ramapo Rivers), 4 (Lower Passaic and Saddle Rivers), 5 (Hackensack River), and 6 (Upper Passaic, Whippany and Rockaway Rivers). The present Northeast study area (Figure 4) includes a total of 103 sampling sites, AN0205 – 293 (see Table 2, Volume 2). Site AN0231C (Slough Bk) was not sampled due to lack of flow. This resulted in 102 sites sampled and assessed for Round 4.
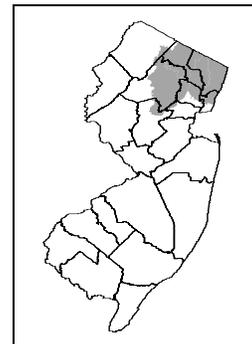
Figure 4

Map of Round 4 study area

FIELD & LABORATORY METHODS

Benthic macroinvertebrate sampling and analysis is performed in accordance with the NJDEP Field Procedures Manual [5], Rapid Bioassessment Protocol (RBP) guidelines of the USEPA [6] and Standard Operating Procedures (SOP) (see http://www.state.nj.us/dep/wms/bfbm/download/AMNET_SOP.pdf) of the NJDEP Aquatic Biomonitoring Laboratory [7]. As detailed in the SOP and in the quality assurance work plan [8], a thorough quality control program, with emphasis on macroinvertebrate taxonomy, is practiced.

Sample Collection

In general, a "multi-habitat" approach is used, focusing on the more productive habitat types [6]. The usual sampling device is a D-frame kick net of 800 x 900 um mesh size and one foot width (a 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 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 [9] 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, 100 meters. Level of effort is consistent for all sites. Where possible, sampling is done upstream of bridges, sufficiently removed from the influence of any associated channel alterations. 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 habitat, surrounding land use, potential pollution sources, and presence of other aquatic biota are recorded (Appendix D, Volume 2); a visual-based qualitative habitat assessment [6] is also performed (see Supplemental Analyses/Evaluation Methods). 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 grids of equal size. Using low-power magnification (6.3x), all organisms greater than 2mm in size are then removed from each randomly selected grid 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. Leica Model MZ6 stereomicroscopes and Leica Models DMLS and DME compound microscopes are currently used. 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. An indexed list of these is given in the AMNET SOP [7]. 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.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. A macroinvertebrate specimen reference collection is also maintained.

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.

The data analysis is an important part of the RBP protocol. Developed under USEPA auspices as an expedient and cost-effective monitoring tool, it recognizes the use of 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, 10]. 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 assessment 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. Scoring criteria for RBP protocols [1] are calibrated for genus level taxonomy, giving four final rating categories ("excellent", "good", "fair", and "poor").

Multimetric Index Development

Previously, a single statewide index, the New Jersey Impairment Score (NJIS), was used in assigning one of three assessment ratings, non-impaired, moderately impaired, and severely impaired. The NJIS was limited in that it used family level taxonomic identification for calculating scores and did not account for

geographical differences in macroinvertebrate community structures. To resolve these limitations, three indices are now used for assessments; High Gradient Macroinvertebrate Index (HGMI), Coastal Plain Macroinvertebrate Index (CPMI), and Pinelands Macroinvertebrate Index (PMI). These indices account for the State's geographically different regions and use genus level taxonomic identification for calculating scores. For the Northeast Water Region assessments, HGMI was used. The higher level of identification allows for more resolute and accurate results at four assessment rating levels (rather than the three previously used); "excellent", "good", "fair", and "poor".   The results are considered reflective of the water and/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 Water Quality Monitoring and Assessment Report.   AMNET data are also integral for designation of Category 1 waters, based on exceptional ecological significance.   New Jersey's benthic macroinvertebrate communities can be statistically grouped into three distinct structures based on geographical regions: high gradient (above the Fall Line), low gradient (Coastal Plain excluding the Pinelands), and Pinelands. To accurately assess biological conditions, a multimetric index was developed using genus-level taxonomic identifications for each distinct region using guidelines outlined in USEPA *Rapid Bioassessment Protocols(RBP) for Use in Wadeable Streams and Rivers* (see http://www.epa.gov/bioindicators/html/rbps.html) [6]. All current assessments use one of the three genus level indices. Each index is described below and is used in each water region in this manner (see Figure 1A,index boundary map): Northwest Region, HGMI & CPMI; Northeast Region, HGMI; Raritan Region, HGMI & CPMI; Atlantic Region, CPMI & PMI; Lower Delaware Region, CPMI & PMI. The final index scores were derived in coordination with professional staff from Water Monitoring and Standards' Bureau of Freshwater and Biological Monitoring, Water Monitoring and Standards' Bureau of Water Quality Standards and Assessment, USEPA, United States Geological Survey (USGS), and the Delaware River Basin Commission (DRBC).

High Gradient and Low Gradient Streams
Two of the indices (see Table 1) to be employed in New Jersey, the High Gradient Macroinvertebrate Index (**HGMI**) [11] and Coastal Plain Macroinvertebrate Index (**CPMI**) [12], were developed using guidelines outlined in USEPA *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers* [6].   The resolution of index scoring thresholds was further enhanced by establishing a graphical relationship between the scores for each index and the tiers these scores represent in the context of a Biological Condition Gradient (BCG). The final index scoring thresholds serves to assess each site from two perspectives: the condition of the macroinvertebrate community and the regulatory use attainment.

The final index scores were derived in coordination with professional staff from Water Monitoring and Standards' Bureau of Freshwater and Biological Monitoring, Water Monitoring and Standards' Bureau of Water Quality Standards and Assessment, USEPA, United States Geological Survey (USGS), and the Delaware River Basin Commission (DRBC). For each index, four descriptive categories were established at break points along the statistical distribution of scores from reference to degraded conditions, coordinated to the BCG to increase the accuracy; "excellent", "good", "fair", and "poor" (see Table A1). "Excellent" and "good" fall into the acceptable regulatory range of fully attaining the aquatic life use. "fair" and "poor" fall below the acceptable regulatory range and are considered impaired, from a Federal Clean Water Act (CWA) perspective, and not attaining the use.

Pinelands Streams
The Pinelands Macroinvertebrate Index (**PMI**) [13] was developed using the same USEPA guidelines and professional coordination as above. However, since a BCG was not developed, and not necessary from a regulatory standpoint, a graphical relationship between index scores and the BCG tiers was not generated. As with the high and low gradient indices, four descriptive categories were established at break points

along the statistical distribution of scores from reference to degraded conditions "excellent", "good", "fair", and "poor" (see Table A1). For waters with a Surface Water Classification of "PL", "excellent" and "good" are classified as reference or natural conditions of Pineland waters and fall into the acceptable regulatory range of fully attaining the aquatic life use. "Fair" and "poor" fall below the acceptable regulatory range of PL waters and are considered impaired, from a CWA perspective, and not attaining the use.

The unique chemical, physical, and biological properties characteristic of waters contained with the Pinelands area are also present for varying distances outside this jurisdictional delineation. To assess these Pinelands-like waters outside the Pinelands boundary, the Department delineated a 5 kilometer buffer around the Pinelands Area and will apply the PMI to this region. Pinelands-like waters outside the jurisdictional delineation, however, have a Surface Water Classification of FW2 and not PL. From a regulatory standpoint FW2 waters are held to a somewhat lower level of biological expectation than the Outstanding National Resource Waters (ONRW) waters contained within the PL designated area. Because of this lower regulatory expectation for FW2 waters, the PMI category of "fair" and above will be regarded as fully attaining the aquatic life use, i.e. biologically *nonimpaired* from a regulatory perspective. FW2 waters in this buffer region assessed as "poor" will be regarded as *impaired* and not supporting the aquatic life use.

Table A1: Descriptive and regulatory thresholds for Fresh Water High Gradient (Highlands, Ridge and Valley, Piedmont), Low Gradient (Coastal Plain, Excluding Pinelands Waters) and Pinelands Waters.

High Gradient Macroinvertebrate Index (HGMI) (Highlands, Ridge and Valley, Piedmont)		
Assessment category	**Index Score**	**Regulatory Threshold**
Excellent	63 - 100	Full Attainment
Good	<63-42	Full Attainment
Fair	<42-21	Non-Attainment
Poor	< 21	Non-Attainment
Coastal Plain Macroinvertebrate Index (CPMI)		
Assessment category	**Index Score**	**Regulatory Threshold**
Excellent	22 - 30	Full Attainment
Good	20 - 12	Full Attainment
Fair	10 - 6	Non-Attainment
Poor	< 6	Non-Attainment
Pinelands Macroinvertebrate Index (PMI)		
Assessment category	**Index Score**	**Regulatory Threshold**
Excellent	63 - 100	Full Attainment
Good	<63-56	Full Attainment
Fair	<56-34	Non-Attainment(PL) Full Attainment(FW2)
Poor	< 34	Non-Attainment

Trend Analysis
In evaluating the current AMNET data against that of the previous round, a significant improvement or decline is considered to have occurred if the difference in AMNET scores have changed the bioassessment rating. A complete list of site-by-site comparisons is presented in Table 2, Volume 2 where a (+) indicates a significant improvement, a (—) indicates a significant decline, and a (/) indicates no change in rating. If a site was only sampled once in concurrent rounds, the change will have "nd" meaning there was "no data" available for a comparison.

SUPPLEMENTAL ANALYSES / EVALUATION METHODS

Morphological Abnormalities
Occasionally, morphological abnormalities have been found in individual macroinvertebrates recovered in WM&S/BFBM's 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 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, differences in impairment can be attributed to water quality factors; however, physical habitat degradation alone can account for biological impairment in a stream [1]. Parameters evaluated include 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 revised USEPA criteria [6].

The habitat assessment is separated into two basic approaches; one designed for high gradient streams and one designed for low gradient streams [6]. 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 and Pinelands 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.

Chemical Monitoring

WM&S' Bureau of Water Quality Standards and Assessment (WM&S/BWQSA) is responsible for the development, adoption, and administration of New Jersey's Surface Quality Standards (SWQS) and Ground Water Quality Standards (GWQS) [14]. 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 NJDEP programs including: the New Jersey Pollutant Discharge Elimination System Program, Site Remediation Program, and the Division of Land Use Regulation (including the Stream Encroachment 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.

WM&S/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] The federal Clean Water Act mandates that states submit biennial reports to the U.S.Environmental Protection Agency (USEPA) describing the quality of their waters. The biennial Statewide Water Quality Inventory Report or "305(b) Report" must include the status of principal waters in terms of overall water quality and support of designated uses, as well as strategies to maintain and improve water quality. The biennial List of Water Quality Limited Waters or "303(d) List" identifies waters that are not attaining designated uses because they do not meet surface water quality standards despite the implementation of technology-based effluent limits. USEPA has recommended that states integrate their 305(b) reporting requirements with their Section 303(d) reporting requirements. New Jersey has complied with this recommendation through the development of an Integrated Water Quality Monitoring and Assessment Report (Integrated Report). The 2008 Integrated Report includes an "Integrated List of Waters" (Integrated List) that combines the reporting requirements of Sections 305(b) and 303(d) of the Act. The Integrated List identifies the status of all applicable designated uses for every assessment unit by labeling the results of each designated use assessment as one of the five sublists. Sublists 1 through 4 satisfy the assessment and reporting requirements of Section 305(b), while Sublist 5 is used to satisfy Section 303(d). [2]

To prepare the Integrated Report, WM&S/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. Table 5, Volume 2, lists the AMNET sites identified on Sublist 5 (Water Quality Limited Waters). These sites did not attain their designated use because they did not meet SWQS. For details on specific standards used to place sites on Sublist 5, see the 2008 Integrated Water Quality Monitoring and Assessment Report. [2]

The Department will attempt to identify the potential sources of impairment using the 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. At present, no sites have been targeted in this Region for the SI process.

* 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 fourth round of sampling for the Northeast Region AMNET study. For the purpose of comparing Rounds, Round 3 results were re-assessed using the new indices. The Northeast region has shown considerable changes since the previous rounds by virtue of using the more geographically specific assessment. The number of "excellent" and "good" sites has shown a slight increase, while the number of "fair" and "poor" sites has shown a slight decline. The table below presents the proportions of "excellent", "good", "fair", and "poor" AMNET sites for all New Jersey Water Regions in the third AMNET round, plus the fourth round for the Northeast Water Region.

Region	Number of sites (% of total)				
Fourth round	**Excellent**	**Good**	**Fair**	**Poor**	**Total sites**
Northeast	7 (6.9%)	19 (18.6%)	52 (51.0%)	24 (23.5%)	102
Upper Delaware	41 (29.7%)	49 (35.5%)	39 (28.3%)	9 (6.5%)	138
Third round					
Upper Delaware	33 (23.4%)	48 (34.0%)	43 (30.5%)	17 (12.1%)	141
Northeast	8 (7.8%)	13 (12.7%)	56 (54.9%)	25 (24.5%)	102
Raritan	27 (20.8%)	38 (29.2%)	64 (40.0%)	31 (23.8%)	160
Atlantic	53 (27.0%)	44 (22.4%)	77 (39.3%)	22 (11.2%)	196
Lower Delaware	13 (8.1%)	35 (21.9%)	80 (50.0%)	32 (20.0%)	160

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 5 depicts the overall results for the Round 4 study in the Northeast Water Region. Of the 102 monitoring stations sampled during this study period, 7 (6.9%) were found "excellent", 19 (18.6%) "good", 52 (51.0%) "fair", and 24 (23.5%) "poor" (see Table 2, Volume 2).

Northeast Water Region - Round 4 Bioassessment Results

(102 total sites)

Good 18.6%
Excellent 6.9%
Poor 23.5%
Fair 51.0%

Figure 5

Northeast Water Region - Round 3 Bioassessment Results

(102 total sites)

Good 12.7%
Excellent 7.8%
Poor 24.5%
Fair 54.9%
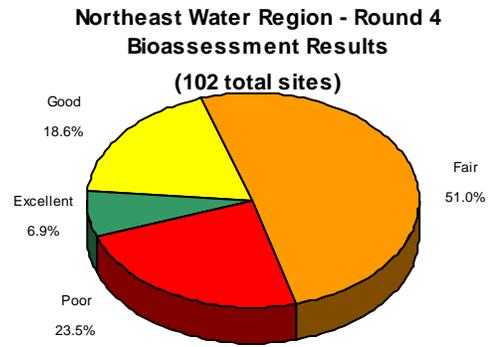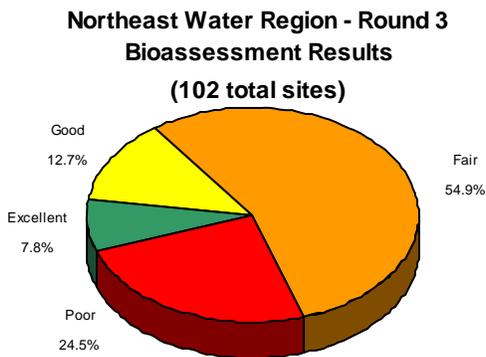
Figure 6

Figure 6 shows the results obtained from 102 AMNET sites within the Northeast Water Region that were sampled during the previous (Round 3) Northeast study (see "Site Selection" p.6 & Table 2, Volume 2). While the results for Round 4 were similar to those for Round 3, for the current sampling period the numbers of "good" sites were slightly higher, and the number of "excellent", "fair", and "poor" sites were slightly lower. [4].

Figure 7 displays the percentage of change in rating among the same 101 AMNET sites in the Northeast Water Region that were sampled during the third round study period [4], and again during the current (Round 4) study period (see "Site Selection" & 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 is defined as an improved rating from the previous Round's rating, while a negative change is defined as a downgraded rating from the previous Round (see Table 2, Volume 2).

Percent Change in Rating Between the Round 3 and the Round 4 Monitoring

(101 sites total)

Positive Change 21.8%
Negative Change 17.8%
No Change 60.4%
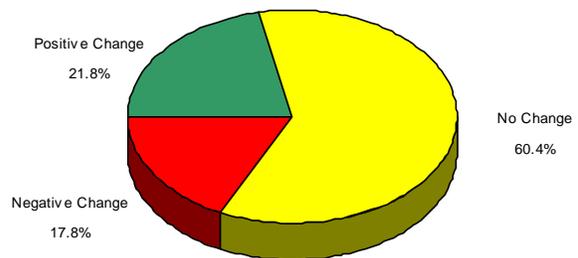
Figure 7

Regional Results

A USGS study, using data generated from NJDEP's AMNET program [15], 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 (i.e. Reading Prong/Highlands). Conversely, an impaired community was most positively related to the area of urban land, and to the total volume of wastewater (point source) discharge [15]. The table below presents the proportion of "excellent", "good",

Figure 8

"fair", and "poor" AMNET sites, based on the current data, in each of the Northeast Watershed Management Areas.
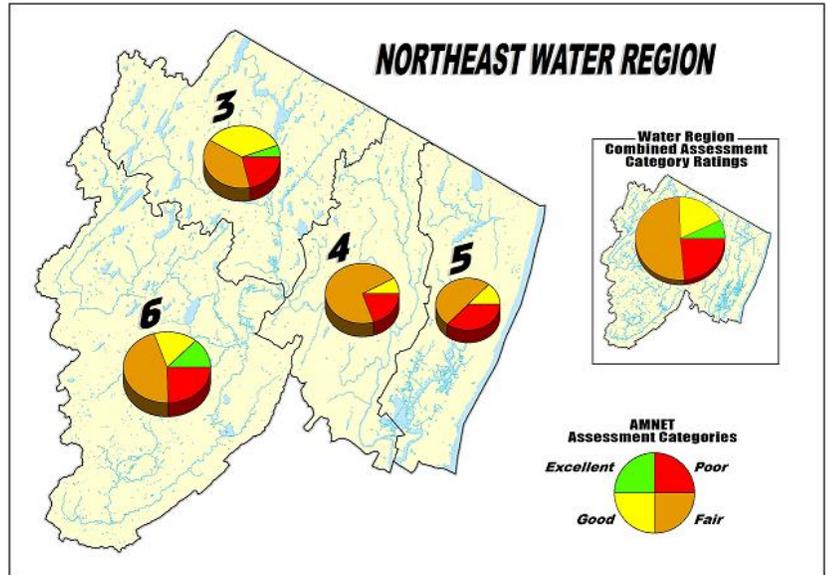
WMA	Sub-basins	Excellent	Good	Fair	Poor	Total sites
3	Pompton/ Wanaque/ Ramapo Rivers system	1 (5.3%)	7 (36.8%)	7 (36.8%)	4 (21.1%)	19
4	Lower Passaic/ Saddle Rivers system	--	2 (7.7%)	19 (73.1%)	5 (19.2%)	26
5	Hackensack/ Pascack Rivers system	--	1 (12.5%)	4 (50.0%)	3 (37.5%)	8
6	Upper Passaic/ Whippany/ Rockaway Rivers system	6 (12.2%)	9 (18.4%)	22 (44.9%)	12 (24.5%)	49
	Totals:	7 (6.9%)	19 (18.6%)	52 (51.0%)	24 (23.5%)	102

Figure 8 illustrates the proportions of "excellent", "good", "fair", and "poor" sites in each WMA of the Northeast Water Region for the current AMNET round.

Evaluation by WMA

Watershed Management Area #3 includes a total of 19 AMNET sites in the Belcher Creek, Clinton Brook, Green Brook, Kanouse Brook, Macopin River, Meadow Brook, Mossmans Brook, Packanack Brook, Pequannock River, Pompton River, Ramapo River, and Wanaque River watersheds, in Bergen, Morris, Passaic, and Sussex Counties (see Map 2, Volume 2). Figure 9 shows the current site rating summaries for WMA #3
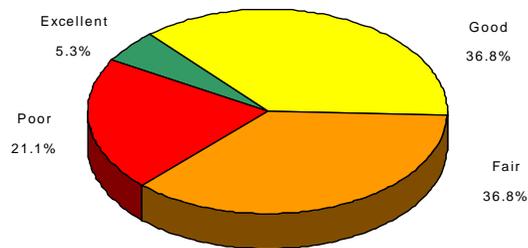
Figure 9

with 5.3% (1 site) "excellent", 36.8% (7 sites) "good", 36.8% (7 sites) "fair", and 21.1% (4 sites) "poor". Figure 10 depicts the results obtained from 19 sites sampled during the earlier (Round 3) survey [4]. Comparing the current results to the earlier results, a significant improvement is seen at 7 sites and a significant decline at 5 sites (see Table 2, Volume 2). The number of
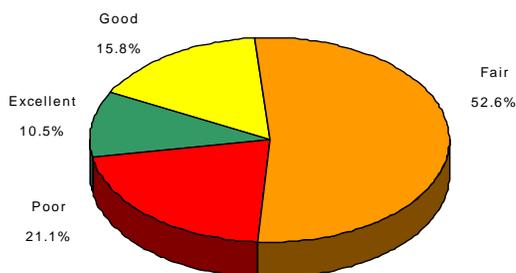
Figure 10

"good" sites is slightly higher than the earlier data, and the number of "excellent" and "fair" sites have declined, with the number of "poor" sites remaining the same. The majority (73.7%) of habitat scores are in the suboptimal range, with 15.8% receiving an optimal score and 10.5% receiving a marginal score. Abnormalities in chironomid larvae and other invertebrate families were not found at any sites. The table below presents a synopsis of AMNET data for WMA #3; AMNET site locations and bioassessment ratings within WMA #3 are shown in Figure 11.
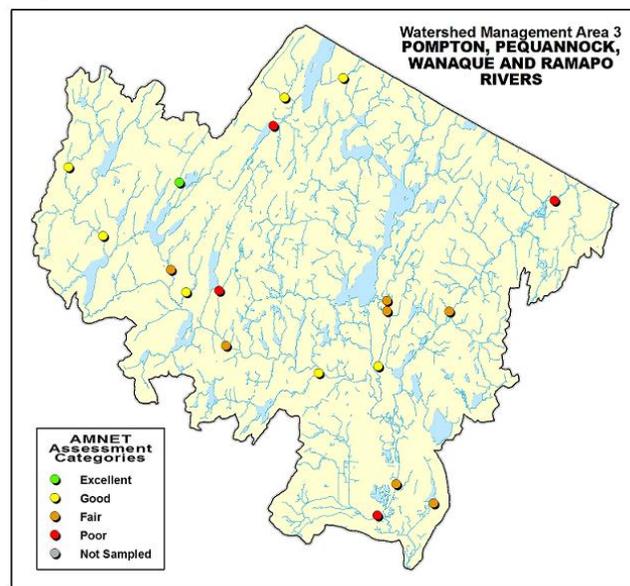
Figure 11

WMA # 3 Combined Results Table

Bio Rating	Round 3		Round 4		Habitat Assessment	Round 4	
Excellent	2	10.5%	1	5.3%	Optimal	3	15.8%
Good	3	15.8%	7	36.8%	Suboptimal	14	73.7%
Fair	10	52.6%	7	36.8%	Marginal	2	10.5%
Poor	4	21.1%	4	21.1%	Poor	---	---
Total sites	19		19			19	

Watershed Management Area #4 includes a total of 26 AMNET sites in the Deepavaal Bk, Diamond Bk, Goffle Bk, Hohokus Bk, Molly Ann Bk, Passaic River, Peckman River, Preakness Bk, Ramsey Bk, Saddle River, and Third River watersheds, in Bergen, Essex, and PassaicCounties (see Maps 3 & 4, Volume 2). Site AN0293 (Second River) was not sampled because it was determined to be a freshwater tidal site and NJDEP's protocol states that only "non-tidal" streams are sampled. Figure 13 shows the current site rating summaries for WMA # 4: 7.7% (2 sites) "good", 73.1% (19 sites) "fair", and 19.2% (5 sites) "poor".

Figure 12 depicts the results obtained from 25 sites sampled during the earlier (Round 3) survey [4]. Comparing the current (Round 4) impairment rating results to the earlier (Round 3) results, a significant improvement is apparent at four sites and a significant decline at four sites (see Table 2, Volume 2). The number of "good" and "poor" sites decreased slightly, while the number of "fair" sites increased slightly, since the earlier sampling (see Table 2, Volume 2). The majority (80.8%) of habitat scores are in the suboptimal range with 19.2% receiving a marginal score. Abnormalities in chironomid larvae and other invertebrate families was found at one site (Third River) (see Maps 3 & 4, Table 3, Volume 2). This site did not display chronic abnormalities (see Table 3, Volume 2). The table below presents a synopsis of AMNET data for WMA #4; AMNET site locations and bioassessment ratings within WMA #4 are shown in Figure 14.

Watershed Management Area 4
Round 4 Bioassessment Results
(26 total sites)

Good 7.7%
Fair 73.1%
Poor 19.2%

Figure 12

Watershed Management Area 4
Round 3 Bioassessment Results
(25 total sites)

Good 12.0%
Fair 64.0%
Poor 64.0%

Figure 13

Watershed Management Area 4
LOWER PASSAIC AND SADDLE

AMNET Assessment Categories
- Excellent
- Good
- Fair
- Poor
- Not Sampled
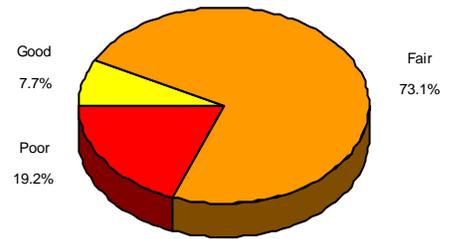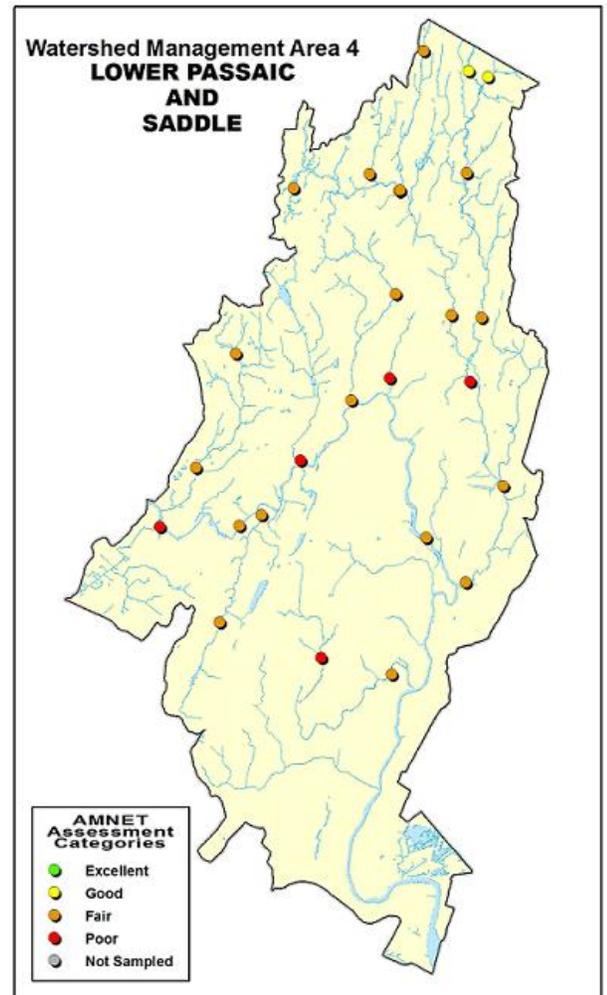
Figure 14

WMA # 4 Combined Results Table

Bio Rating	Round 3		Round 4			Habitat Assessment	Round 4	
Excellent	---	---	---	---		Optimal	---	---
Good	3	12.0%	2	7.7%		Suboptimal	21	80.8%
Fair	16	64.0%	19	73.1%		Marginal	5	19.2%
Poor	6	24.0%	5	19.2%		Poor	---	---
Total sites	25		26				26	

Watershed Management Area #5 includes a total of 8 AMNET sites in the Dorotockeys Run, Dwars Kill, Hackensack River, Musquapsink Bk, Overpeck Ck, Pascack Bk, Tenakill Bk, and Van Saun Bk watersheds, in Bergen County (see Map 5, Volume 2). Figure 15 shows the current site rating summaries for WMA # 5: 12.5% (1 site) "good", 50.0% (4 sites) "fair", and 37.5% (3 sites) "poor". Figure 16 depicts the results obtained from 8 sites sampled during the earlier (Round 3) survey [4]. Comparing the current to the earlier results, a significant improvement is seen at 2 sites, and a significant decline, at 3 sites (see Table 2, Volume 2). The number of "excellent" sites decreased slightly from that of the earlier sampling, and the number of "good" sites is slightly increased, with the number of "fair" and "poor" sites remaining the same (see Table 2, Volume 2).

The majority of sites (87.5%) received an suboptimal habitat score, with 12.5% receiving a marginal score. Abnormalities in chironomid larvae and other invertebrate families were found at four sites (Dwars Kill, Hackensack River, Pascack Bk, and Tenakill Bk) (Map 5, Table 3, Volume 2). Two of these sites (AN0207 and AN0209) displayed chronic abnormalities (see Table 3, Volume 2). The table below presents a synopsis of AMNET data for WMA #5; AMNET site locations and bioassessment ratings within WMA # 5 are shown in Figure 17.

Watershed Management Area 5
Round 4 Bioassessment Results
(8 total sites)
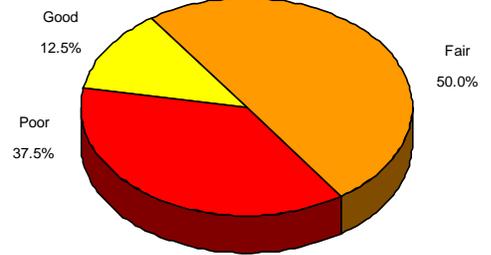
Figure 15

Watershed Management Area 5
Round 3 Bioassessment Results
(8 total sites)
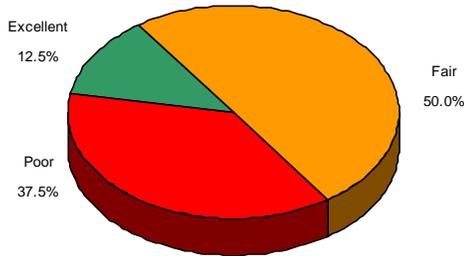
Figure 16
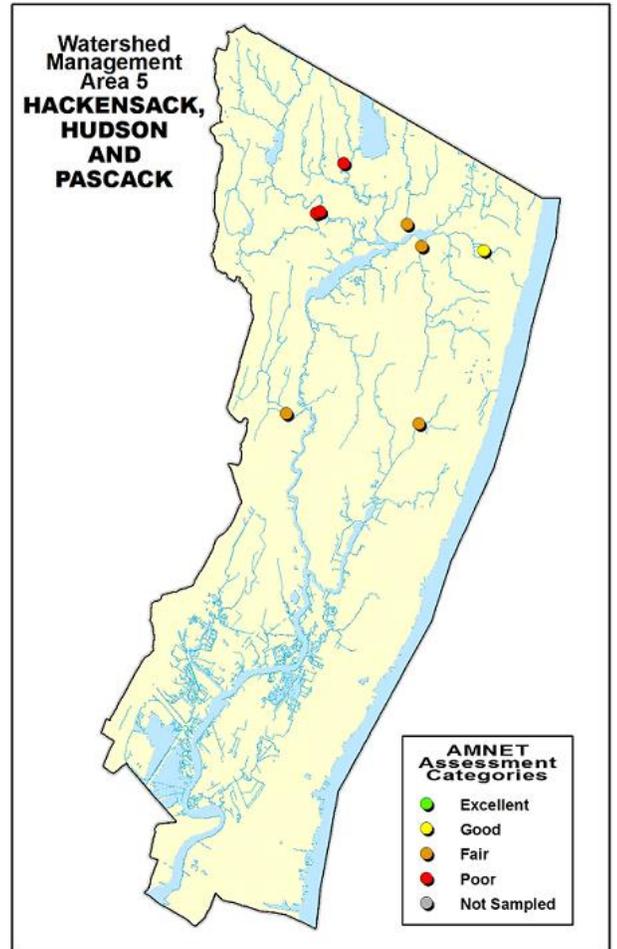
Figure 17

WMA # 5 Combined Results Table

Bio Rating	Round 3		Round 4		Habitat Assessment	Round 4	
Excellent	1	12.5%	---	---	Optimal	---	---
Good	---	---	1	12.5%	Suboptimal	7	87.5%
Fair	4	50.0%	4	50.0%	Marginal	1	12.5%
Poor	3	37.5%	3	37.5%	Poor	---	---
Total sites	8		8			8	

Watershed Management Area #6 includes a total of 49 AMNET sites in the Beaver Bk, Black Bk, Canoe Bk, Crooked Bk, Dead River, Den Bk, Great Bk, Green Pond Bk, Harrison Bk, Indian Grave Bk, Loantaka Bk, Malapardis Bk, Mill Bk, Passaic River, Primrose Bk, Rockaway River, Russia Bk, Stony Bk, Troy Bk, Watnong Bk, and Whippany River watersheds, in Essex, Morris, Somerset and Union Counties (see Maps 6, 7, & 8, Volume 2). Site AN0231C (Slough Bk) was not sampled due to no stream flow. Figure 18 shows the current site rating summaries for WMA # 6: 12.2% (6 sites) "excellent", 18.4% (9 sites) "good", 44.9% (22 sites) "fair", and 24.5% (12 sites) "poor". Figure 19 depicts the results obtained from 50 sites sampled during the earlier (Round 3) survey [4]. Comparing the current to the earlier results, a significant improvement is seen at 9 sites, and a significant decline, at 6 sites (see Table 2, Volume 2). The number of "excellent" and "good" sites increased slightly from that of the earlier sampling, and the number "fair" sites is slightly decreased, with the number of "poor" sites remaining the same (see Table 2, Volume 2). The majority of sites (71.4%) received an suboptimal habitat score, with 16.3% receiving an optimal score and 12.3% receiving a marginal score. Abnormalities in chironomid larvae and other invertebrate families were found at 7 sites (Black Bk, Dead River, Great Bk, Harrison Bk, and 3 Passaic River sites) (Maps 6, 7, & 8, Table 3, Volume 2). One of these sites (AN0226) displayed chronic abnormalities (see Table 3, Volume 2). The table below presents a synopsis of AMNET data for WMA #6; AMNET site locations and bioassessment ratings within WMA # 6 are shown in Figure 20.

Watershed Management Area 6
Round 4 Bioassessment Results
(49 total sites)
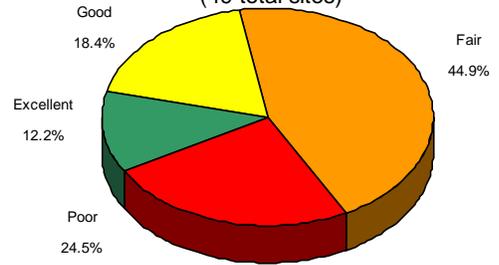
Figure 18

Watershed Management Area 6
Round 3 Bioassessment Results
(50 total sites)

Figure 19

Watershed Management Area 6
UPPER PASSAIC, WHIPPANY AND ROCKAWAY
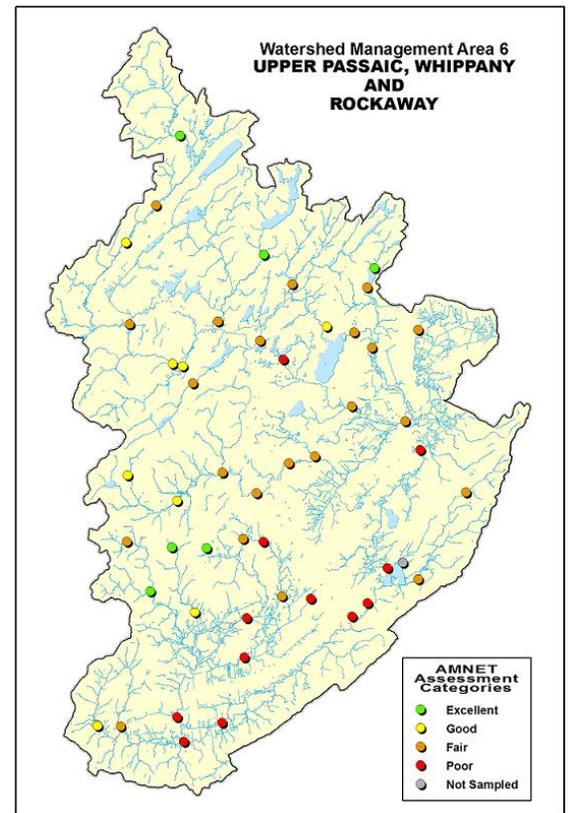
Figure 20

WMA # 6 Combined Results Table

Bio Rating	Round 3		Round 4		Habitat Assessment	Round 4	
Excellent	5	10.0%	6	12.2%	Optimal	8	16.3%
Good	7	14.0%	9	18.4%	Suboptimal	35	71.4%
Fair	26	52.0%	22	44.9%	Marginal	6	12.3%
Poor	12	24.0%	12	24.5%	Poor	---	---
Total sites	50		49			49	

Macroinvertebrate Abnormalities

Occasionally, morphological abnormalities have been found in individual macroinvertebrates recovered in WM&S/BFBM's 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 [16].

Hamilton and Saether [17] 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 [18]. Most of the research has been focused on a few genera. The North Carolina Division of Environmental Management [19] has developed an index to evaluate deformities, using the frequency and severity of deformities observed in Chironomidae larvae of just the genus *Chironomus*. Secondly, 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 [18]. 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 [20].

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 Northeast Water Region exhibiting these deformities is presented in Table 3, Volume 2. 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 index scoring, but used to identify sites where additional investigations are needed.

A slight decrease in the number of abnormalities are seen in the current sampling as compared to the previous (Round 3) sampling [4]. From the current sampling of 102 sites, 12 (11.8%) contained organisms with abnormalities (Maps 2 - 8 , Volume 2). Only three of the sites (AN0207, AN0209, and AN0226) exhibited a "chronic" presence of abnormalities (Table 3, Volume 2). Further study is needed to establish the significance of the presence of abnormalities.

Causes of Biological 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. Although bioassessments are useful for identifying biological impairments, they do not identify the cause or causes of impairments. Linking biological effects with their causes is particularly complex when multiple stressors impact a waterbody [21]. A more intensive Stressor Identification (SI) study is necessary in order to pinpoint the probable cause or causes of the observed biological impairment.

Some common candidate causes which frequently appear on the USEPA's 303(d) list of impaired waterbodies include [22]:

> Metals
> Sediments
> Nutrients
> Dissolved Oxygen
> Temperature
> Ionic Strength
> Flow Alteration
> Unspecified Toxic Chemicals

Habitat Assessment vs. Biological Assessment

The relationship between habitat assessment scores and corresponding biological assessment 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 assessment. 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 Northeast Water Region, an overall R^2 value of 0.26 was calculated when comparing the assessments. This can be interpreted that for all sites in this region, a strong direct correlation between assessments existed 26% of the time. An R^2 value was also calculated, individually, for the four WMA's in this Water Region. The R^2 values for WMA 3, 4, 5, and 6, were 0.45, 0.17, 0.004, and 0.24 respectively. Again, this indicates that a strong direct correlation between habitat and biological impairment existed 0.4% - 45% 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 assessments. Sites with a "fair" or "poor" biological assessment, but with a relatively high habitat assessment score, could be impacted by point and/or nonpoint sources outside the range of the visual based 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 that is affecting the biota. Some sites assessed with an "excellent" or "good" 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 effect 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.

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

[15]. 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 [15]. 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. This is demonstrated in the North East Water Region by the high impairment in relation to the high percentage of urbanization. Data analysis from Ayers et al., 2000 [23] 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

Additional Information on the AMNET program can be obtained from the WM&S' Bureau of Freshwater & Biological Monitoring by calling 609-292-0427 or visiting its website at: http://www.state.nj.us/dep/wms/bfbm

Raw data is posted on this website by the end of the calendar year that the data is received and validated.

Additionally, raw data is submitted to WQX as soon as the data is received and validated.   WQX is USEPA's repository and framework for water quality, biological, and physical data. It is used by state environmental agencies, EPA and other federal agencies, universities, private citizens, and many others to store data. The retrieval of the data is handled through the STORET interface and can be accessed at: http://www.epa.gov/storet

Comments are welcome and may be emailed to: bfbm@dep.state.nj.us.

For more information, please contact:

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http://www.state.nj.us/dep/wms/bfbm

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Table 1

Coastal Plain Macroinvertebrate Index (CPMI)[1]

Study area: southern New Jersey, below the geologic fall-line; Middle Atlantic Coastal Plain ecoregion, excluding the Pinelands National Reserve. See figure A1.

Index Metrics
1. Total number of genera
2. Total number of EPT genera
3. Percent Ephemeroptera genera
4. Hilsenhoff Biotic Index
5. Percent Clinger genera

Index Metric	Score			
	6	4	2	0
Number of genera	>25	17-25	9-16	<9
Number of EPT genera	>9	7-9	4-6	<4
% of Ephemeroptera	>29	20-29	10-19	<10
Hilsenhoff Biotic Index	<4.9	4.9-6.0	6.1-7.3	>7.3
% Clingers	>51	34-51	17-33	<17

Assessment Rating	Score
Excellent	22-30
Good	12-20
Fair	10-6
Poor	< 6

Reference
J.R. Maxted, et al. Assessment framework for mid-Atlantic coastal plain streams using benthic macroinvertebrates. J.N. Am. Benthol. Soc. 2000, 19(1):128-144.

Attributes

Excellent: Minimal changes in structure of biological community and minimal changes in ecosystem function. Virtually all native taxa are maintained with some changes to biomass and/or abundance; ecosystem functions are fully maintained within the range of natural variability.

Good: Some evident changes in structure of the biotic community and minimal changes in ecosystem function. Some changes in structure due to loss of some rare native taxa; shifts in relative abundance of taxa but sensitive-ubiquitous taxa are common and abundant; ecosystem functions are fully maintained.

Fair: **Moderate to major changes in structure of biological community and moderate changes in ecosystem function.** Sensitive taxa are markedly diminished; conspicuously unbalanced distribution of major groups from that expected; organism condition shows signs of physiological stress; system function shows reduced complexity.

Poor: Extreme changes in structure of biological community and major loss of ecosystem function. Extreme changes in structure; wholesale changes in taxonomic composition; extreme alterations from normal densities and distributions; organism condition is often poor; ecosystem functions are severely altered.

[1] Based on 100 organism subsample, genus level taxonomy

Table 1 (cont)

Pinelands Macroinvertebrate Index (PMI)[1]

Study area: southern New Jersey, below the geologic fall-line within the Pinelands National Reserve and extending 5 kilometers outside the Reserve boundary. See figure A1.

<u>Index Metrics</u>

1. Number of Insect genera
2. Number of Non-insect genera
3. Percent Plecoptera (P) and Trichoptera (T)
4. Percent Diptera genera excluding Tanytarsini
5. Percent Mollusca and Amphipoda
6. Beck's Biotic Index
7. Percent Filterers

<u>Assessment Rating</u>	<u>Score</u>
Excellent	≥ 63
Good	< 63-56
Fair	< 56-34
Poor	< 34

<u>Reference</u>
Benjamin Jessup, et al. Report. Development of the New Jersey Pinelands macroinvertebrate index (PMI). TetraTech, Inc. Owings Mills, MD. March, 2005.

Attributes

Excellent: Minimal changes in structure of biological community and minimal changes in ecosystem function. Virtually all native taxa are maintained with some changes to biomass and/or abundance; ecosystem functions are fully maintained within the range of natural variability.

Good: Some evident changes in structure of the biotic community and minimal changes in ecosystem function. Some changes in structure due to loss of some rare native taxa; shifts in relative abundance of taxa but sensitive-ubiquitous taxa are common and abundant; ecosystem functions are fully maintained.

Fair: **Moderate to major changes in structure of biological community and moderate changes in ecosystem function.** Sensitive taxa are markedly diminished; conspicuously unbalanced distribution of major groups from that expected; organism condition shows signs of physiological stress; system function shows reduced complexity.

Poor: Extreme changes in structure of biological community and major loss of ecosystem function. Extreme changes in structure; wholesale changes in taxonomic composition; extreme alterations from normal densities and distributions; organism condition is often poor; ecosystem functions are severely altered.

[1] Based on 100 organism subsample, genus level taxonomy

Table 1 (cont)

High Gradient Macroinvertebrate Index (HGMI)[1]

Study area: northern New Jersey, above the geologic fall-line including the following ecoregions:
North Central Appalachians, Central Appalachian Ridges and Valleys, Northeastern Highlands, Northeastern Coastal Zone, and Northern Piedmont. See figure A1.

Index Metrics
1. Total number of genera $_{adj}$ = 26.53 + Metric – [22.776 + 4.173*log10(areasqkm)]
2. Percent of genera that are not insects
3. Percent sensitive EPT (excluding Hydropyschidae, including Diplectrona) $_{adj}$
      = 37.49 + Metric – [49.922 – 13.800*log10(areasqkm)]
4. Number of scraper genera $_{adj}$ = 5.44 + Metric – [3.889 + 1.724*log10(areasqkm)]
5. Hilsenhoff Biotic Index $_{adj}$ = 4.23 + Metric – [3.407 + 0.918*log10(areasqkm)]
6. Number of New Jersey TALU attribute 2 genera
7. Number of New Jersey TALU attribute 3 genera

ADJ (Adjusted metric value) = Mean $_{reference}$ + Metric $_{observed}$ – Metric $_{predicted}$, where predictions are based on linear regression analysis of reference metric values on catchment size.

Assessment Rating	Score
Excellent	≥ 63
Good	< 63 - 42
Fair	< 42 - 21
Poor	< 21

Reference
Benjamin Jessup, et al. Report. Development of the New Jersey high gradient macroinvertebrate index (HGMI). TetraTech, Inc. Owings Mills, MD. February, 2007.

Attributes

Excellent: Minimal changes in structure of biological community and minimal changes in ecosystem function. Virtually all native taxa are maintained with some changes to biomass and/or abundance; ecosystem functions are fully maintained within the range of natural variability.

Good: Some evident changes in structure of the biotic community and minimal changes in ecosystem function. Some changes in structure due to loss of some rare native taxa; shifts in relative abundance of taxa but sensitive-ubiquitous taxa are common and abundant; ecosystem functions are fully maintained.

Fair: **Moderate to major changes in structure of biological community and moderate changes in ecosystem function.** Sensitive taxa are markedly diminished; conspicuously unbalanced distribution of major groups from that expected; organism condition shows signs of physiological stress; system function shows reduced complexity.

Poor: Extreme changes in structure of biological community and major loss of ecosystem function. Extreme changes in structure; wholesale changes in taxonomic composition; extreme alterations from normal densities and distributions; organism condition is often poor; ecosystem functions are severely altered.

[1] Based on 100 organism subsample, genus level taxonomy

Map of New Jersey Macroinvertebrate Indices
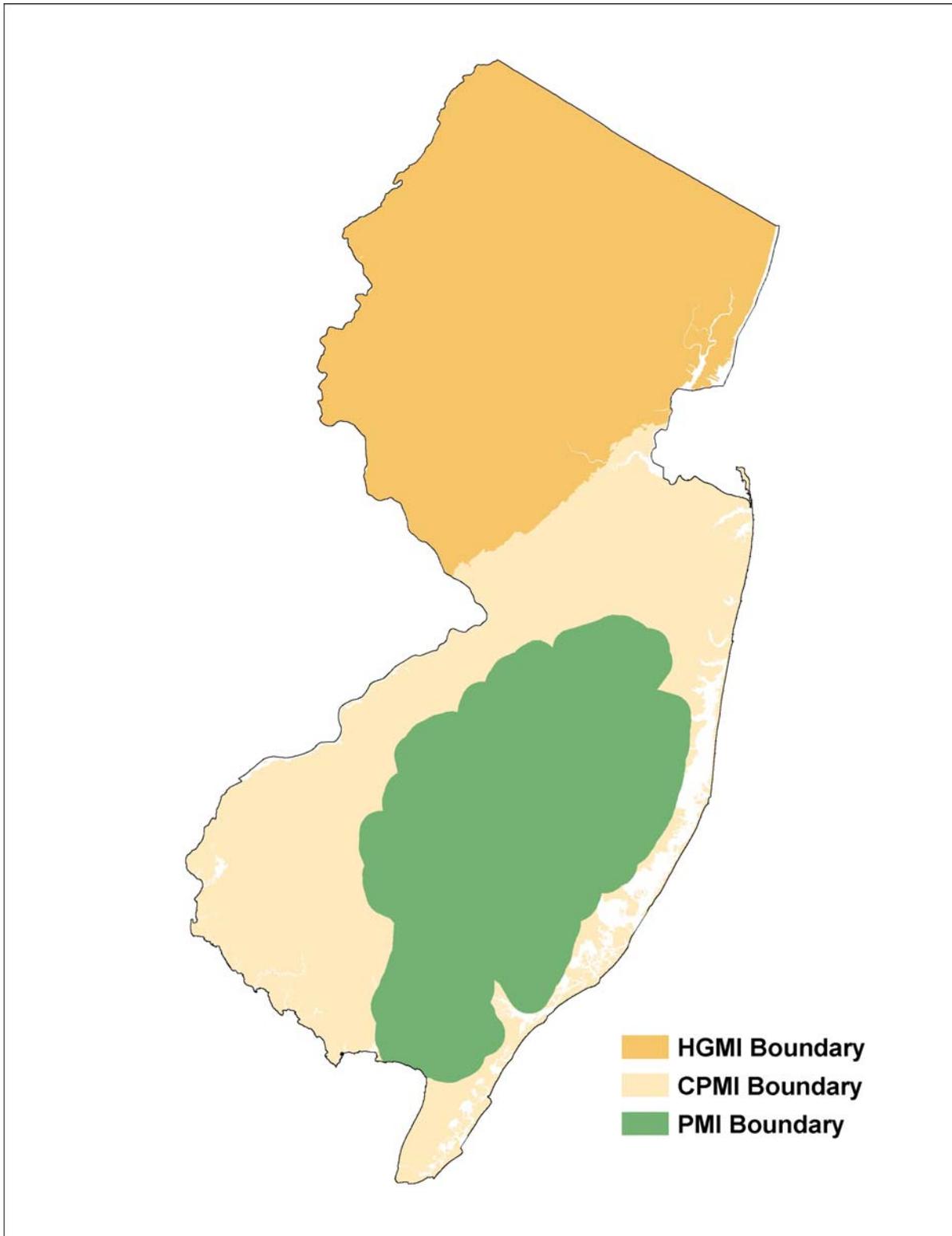
Figure A1. Boundaries for generic level index use.

NJ Department of Environmental Protection
Water Monitoring and Standards

AMBIENT BIOMONITORING NETWORK

Northeast Water Region
Passaic River Drainages

Watershed Management Areas 3, 4, 5, and 6
Round 4 Benthic Macroinvertebrate Data
Volume 2 of 2
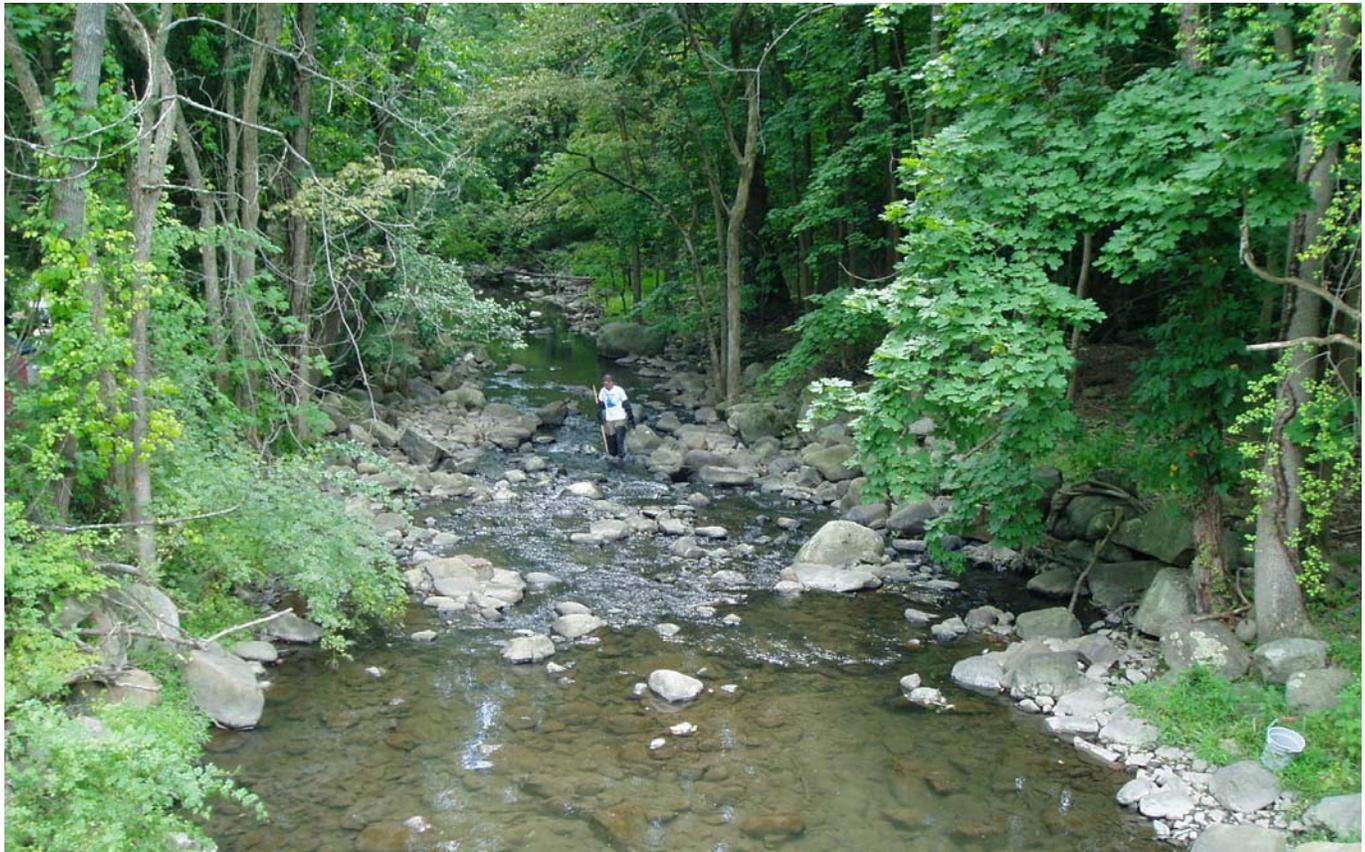
December 2012

State of New Jersey
Chris Christie, Governor
Kim Guadagno, Lt. Governor

NJ Department of Environmental Protection
Bob Martin, Commissioner

AMBIENT BIOMONITORING NETWORK

Northeast Water Region
Passaic River Drainages
Watershed Management Areas 3, 4, 5, and 6

Round 4 Benthic Macroinvertebrate Data

Volume 2 of 2

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[cover photo: Site AN0237, Troy Brook at Beverwyck Rd, Morris County, NJ]

AMBIENT BIOMONITORING NETWORK
Watershed Management Areas 3, 4, 5, and 6

Northeast Water Region
Passaic River Drainages

Round 4 Benthic Macroinvertebrate Data

Volume 2 of 2

TABLE OF CONTENTS

MAPS

Round 4 Northeast Water Region AMNET Study
WMA's 3, 4, 5, & 6

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.

Map 1
**NORTHEAST
WATER
REGION**
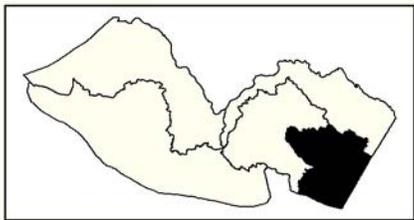
Pompton,
Pequannock,
Wanaque
and
Ramapo

Upper Passaic,
Whippany,
and
Rockaway

Lower Passaic
and
Saddle

Hackensack,
Hudson
and
Pascack
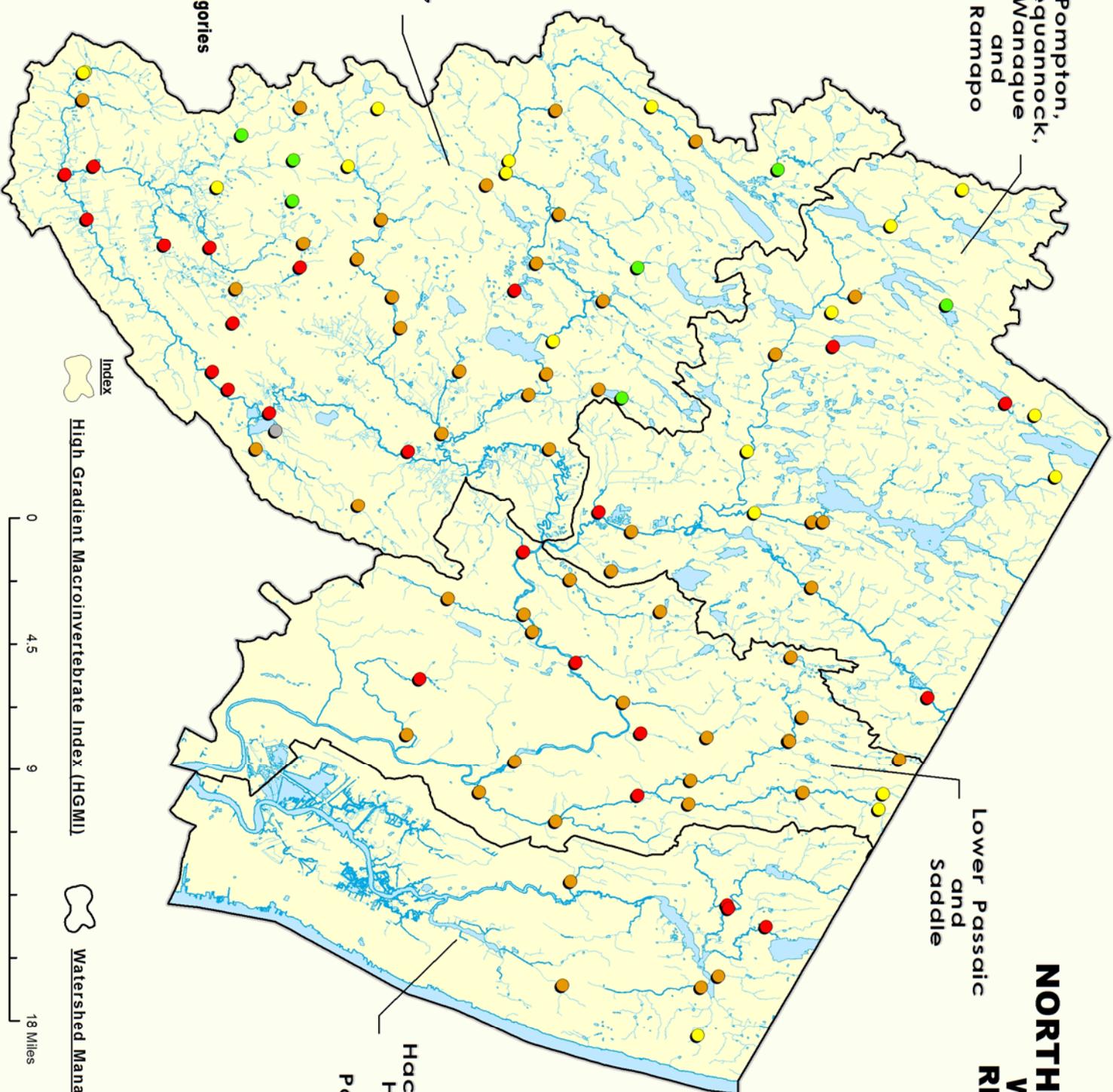
AMNET Assessment Categories

- Excellent
- Good
- Fair
- Poor
- Not Sampled

Index

High Gradient Macroinvertebrate Index (HGMI)

Watershed Management Area

0   4.5   9   18 Miles

1 inch equals 5.15 miles
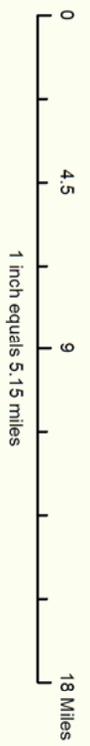
Map 2
POMPTON, PEQUANNOCK, WANAQUE AND RAMAPO RIVERS
Watershed Management Area 3

AMNET Assessment Categories

Index

- ● Excellent
- ● Good
- ● Fair
- ● Poor
- ● Not Sampled

- Macroinvertebrate Abnormalities Present
- Chronic Macroinvertebrate Abnormalities

High Gradient Macroinvertebrate Index (HGMI)

AN0258 - Pequannock River

AN0259 - Pequannock River

AN0260 - Mossmans Brook

AN0255C - Belchers Brook

AN0255D - Green Brook

AN0255 - Wanaque River

AN0262 - Kanouse Brook

AN0261 - Clinton Brook

Holland

AN0264 - Pequannock River

AN0265 - Pequannock River

AN0263 - Macopin River

AN0256 - Wanaque River

AN0269 - Dam Brook Trib to Pompton River

AN0268 - Pompton River

AN0270 - Packanack Brook

AN0257 - Wanaque River

AN0256A - Meadow Brook

AN0267 - Ramapo River

AN0266 - Ramapo River

West Milford

Wanaque

Wayne

Mahwah

515

513

511

697 COUNTY

23

202

504

511 ALT

689 COUNTY

502

287

208

202

17

507

0   1.25   2.5   5 Miles

1 inch equals 2.75 miles

Map 3
SADDLE RIVER
Watershed Management Area 4 (Part)
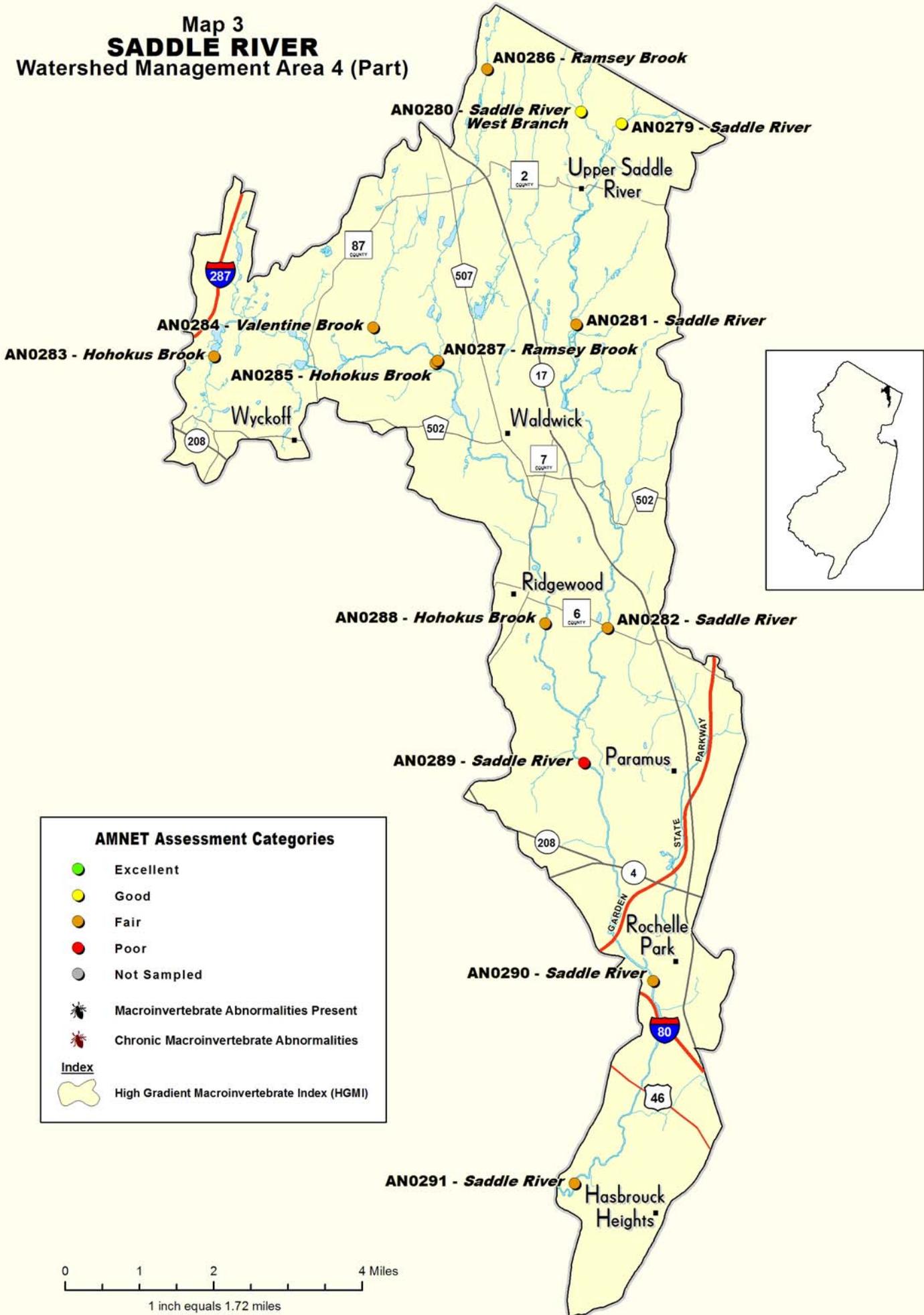
AN0286 - *Ramsey Brook*

AN0280 - *Saddle River West Branch*

AN0279 - *Saddle River*

Upper Saddle River

AN0284 - *Valentine Brook*

AN0281 - *Saddle River*

AN0283 - *Hohokus Brook*

AN0287 - *Ramsey Brook*

AN0285 - *Hohokus Brook*

Wyckoff

Waldwick

Ridgewood

AN0288 - *Hohokus Brook*

AN0282 - *Saddle River*

AN0289 - *Saddle River*

Paramus

AMNET Assessment Categories

- 🟢 Excellent
- 🟡 Good
- 🟠 Fair
- 🔴 Poor
- ⚪ Not Sampled

🐛 Macroinvertebrate Abnormalities Present

🐛 Chronic Macroinvertebrate Abnormalities

Index

High Gradient Macroinvertebrate Index (HGMI)

Rochelle Park

AN0290 - *Saddle River*

AN0291 - *Saddle River*

Hasbrouck Heights

| 0 | 1 | 2 | | 4 Miles |

1 inch equals 1.72 miles

Map 4
LOWER PASSAIC RIVER
Watershed Management Area 4 (Part)
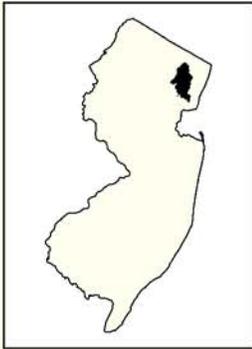
AN0277A - *Goffle Brook*

AN0272 - *Preakness Brook*

AN0278 - *Diamond Brook*

Hawthorne

AN0277 - *Goffle Brook*

AN0276 - *Molly Ann Brook*

AN0273 - *Preakness Brook*

Saddle Brook

AN0271 - *Deepavaal Brook*

AN0275 - *Peckman River*

AN0274 - *Passaic River*

PARKWAY

AN0292O - *Passaic River*

Little Falls

AN0275A - *Peckman River*

AN0292A - *Third River*

Montclair

AN0292 - *Third River*

STATE

GARDEN

Kearny

Newark

NEW JERSEY TURNPIKE

AMNET Assessment Categories

- 🟢 Excellent
- 🟡 Good
- 🟠 Fair
- 🔴 Poor
- ⚪ Not Sampled
- 🦟 Macroinvertebrate Abnormalities Present
- 🦟 Chronic Macroinvertebrate Abnormalities

Index

High Gradient Macroinvertebrate Index (HGMI)

0   1.25   2.5   5 Miles

1 inch equals 2.25 miles

Map 5
HACKENSACK RIVER
Watershed Management Area 5
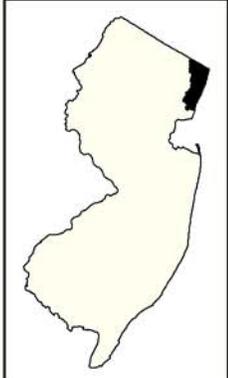
AN0205 - *Hackensack River*

Hillsdale

AN0207 - *Pascack Brook*

AN0206 - *Musquapsink River*

AN0210 - *Dorotockeys Run*

AN0209 - *Tenakill Brook*

AN0208 - *Dwars Kill*

9W

Oradell

502

2
COUNTY

17
COUNTY

501

13
COUNTY

70
COUNTY

Tenafly

505

AN0211 - *Van Saun Brook*

AN0212 - *Overpeck Creek*

503

39
COUNTY

Hackensack

4

80

46

17

120

Fort Lee

67

5

63

505

3

501

1

NEW JERSEY TURNPIKE

NEW JERSEY TURNPIKE

495

678
COUNTY

653
COUNTY

Hoboken

7

139

78

440

PALISADES INTERSTATE PARKWAY

GARDEN STATE PARKWAY

AMNET Assessment Categories

- Excellent
- Good
- Fair
- Poor
- Not Sampled

Macroinvertebrate Abnormalities Present

Chronic Macroinvertebrate Abnormalities

Index

High Gradient Macroinvertebrate Index (HGMI)

0   1.5   3   6 Miles

1 inch equals 2.53 miles
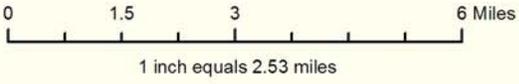
Map 6
ROCKAWAY RIVER
Watershed Management Area 6 (Part)
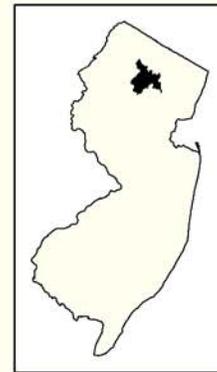
AN0239 - *Russia Brook*

Woodstock

AN0240 - *Rockaway River*

AN0241 - *Rockaway River*

513

AN0245 - *Beaver Brook*

AN0252 - *Crooked Brook*

511

AN0249 - *Stony Brook*

AN0253 - *Crooked Brook*

15

80

AN0242 - *Green Pond Brook*

AN0246 - *Beaver Brook*

287

AN0250 - *Rockaway River*

Boonton

AN0251 - *Rockaway River*

Wharton

AN0248 - *Rockaway River*

202

46

Denville

53

AN0254 - *Crooked Brook*

AN0243 - *Rockaway River*

AN0244 - *Mill Brook*

AN0247 - *Den Brook*

10

AMNET Assessment Categories

- ⬤ Excellent
- ⬤ Good
- ⬤ Fair
- ⬤ Poor
- ⬤ Not Sampled

🐛 Macroinvertebrate Abnormalities Present

🐛 Chronic Macroinvertebrate Abnormalities

Index

High Gradient Macroinvertebrate Index (HGMI)

0   1.25   2.5   5 Miles

1 inch equals 2.13 miles

Map 7
WHIPPANY RIVER
Watershed Management Area 6 (Part)

AMNET Assessment Categories

Excellent
Good
Fair
Poor
Not Sampled

Macroinvertebrate Abnormalities Present
Chronic Macroinvertebrate Abnormalities

Index

High Gradient Macroinvertebrate Index (HGMI)

0   1.25   2.5   5 Miles

1 inch equals 1.39 miles

AN0232 - UNT to Whippany River
(Dismal Brook)

AN0233 - Whippany River

Brookside

AN0234A - Watnong Brook

510

Morristown

510

53

AN0234 - Whippany River

287

AN0235 - Whippany River

623
County

124

24

510

Whippany

AN0238B - Malapardis Brook

Florham
Park

10

202

80

46

AN0236 - Troy Brook

Mountain
Lakes

Parsippany

AN0237 - Troy Brook

511

AN0238 - Whippany River

280
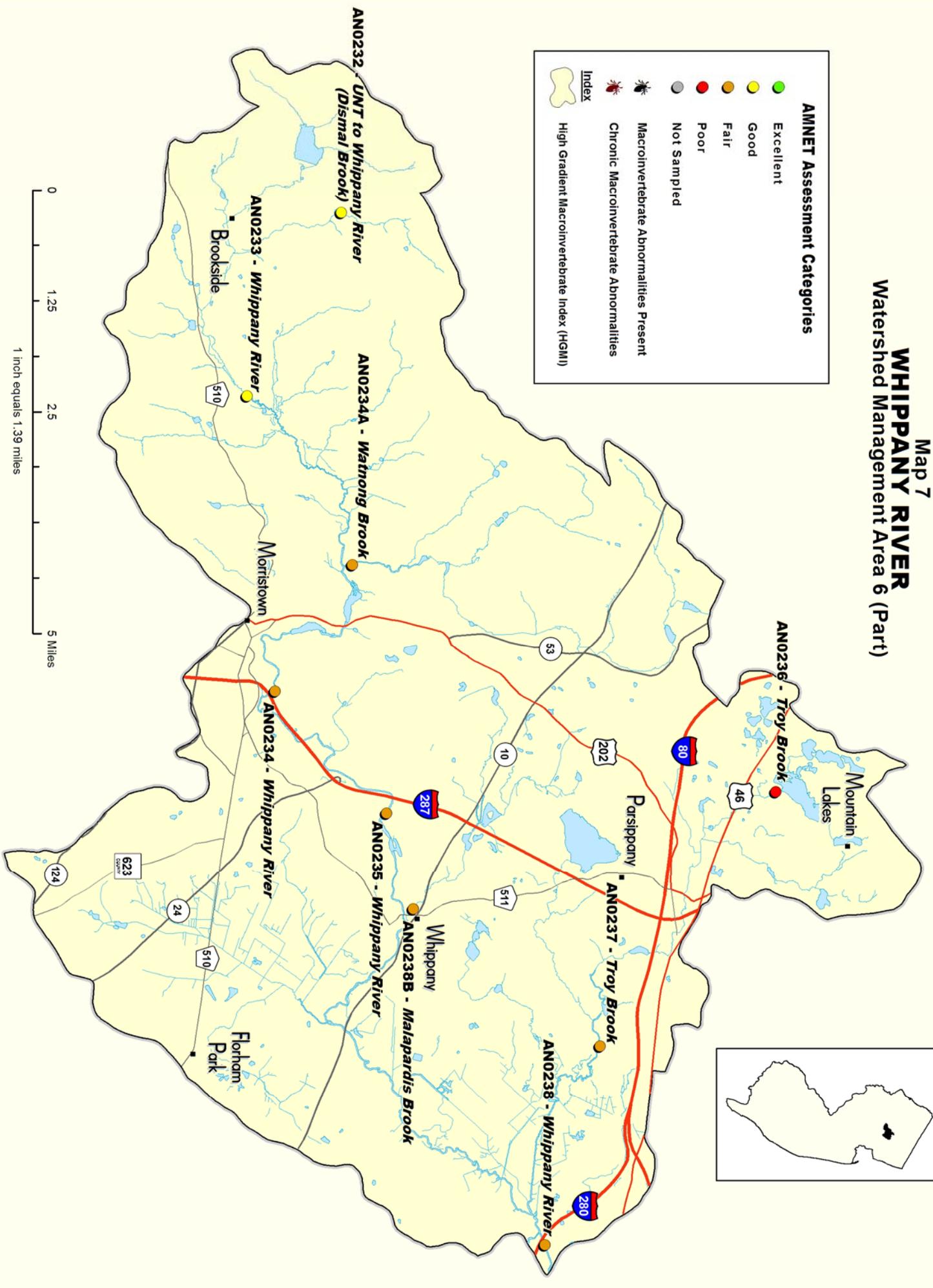
Map 8
UPPER PASSAIC RIVER
Watershed Management Area 6 (Part)

1 inch equals 2.67 miles

0   1.5   3   6 Miles

AN0225 - UNT to Dead River

AN0226 - Dead River

AN0227A - Harrison Brook

AN0224 - Passaic River

AN0227 - Dead River

AN0228 - Passaic River

AN0214 - Indian Grave Brook

AN0216 - Primrose Brook

AN0213 - Passaic River

AN0215 - Primrose Brook

AN0221 - Loantaka Brook

AN0217 - Great Brook

AN0218 - Great Brook

AN0220 - Loantaka Brook

AN0223 - Black Brook

AN0219 - Great Brook

AN0222 - Black Brook

AN0231A - Passaic River

AN0229 - Passaic River

AN0230 - Passaic River

AN0231C - Slough Brook

AN0231D - Canoe Brook

AN0231 - Passaic River

AN0231E - Canoe Brook

AN0274A - Passaic River

Basking Ridge

Millington

Chatham

Livingston

West Caldwell

525
287
78
531
512
202
124
24
510
10
508
527
609 COUNTY
649 COUNTY
280
46
80

Index

AMNET Assessment Categories

- ● Excellent
- ● Good
- ● Poor
- ● Fair
- ● Not Sampled

Macroinvertebrate Abnormalities Present

Chronic Macroinvertebrate Abnormalities

High Gradient Macroinvertebrate Index (HGMI)

Table 2

Comparative Scores / Ratings (see notes)

Watershed Management Areas 3, 4, 5, and 6

Station	Index name	Rnd 3 Score	Rnd 4 Score	Rnd 3 Rating	Rnd 4 Rating	Change in Rating	Rnd 4 Habitat Score	WMA	Station	Index name	Rnd 3 Score	Rnd 4 Score	Rnd 3 Rating	Rnd 4 Rating	Change in Rating	Rnd 4 Habitat Score	WMA
205	HGMI	23.84	20.08	Fair	Poor	—	124	05	238B	HGMI	31.98	28.11	Fair	Fair	/	146	06
206	HGMI	13.75	18.67	Poor	Poor	/	130	05	239	HGMI	60.35	63.01	Good	Excellent	+	154	06
207	HGMI	31.27	11.56	Fair	Poor	—	126	05	240	HGMI	30.89	35.00	Fair	Fair	/	170	06
208	HGMI	63.85	55.26	Excellent	Good	—	136	05	241	HGMI	20.77	43.65	Poor	Good	+	143	06
209	HGMI	13.29	36.05	Poor	Fair	+	132	05	242	HGMI	33.00	38.35	Fair	Fair	/	161	06
210	HGMI	29.90	30.16	Fair	Fair	/	94	05	243	HGMI	33.42	47.40	Fair	Good	+	116	06
211	HGMI	18.92	23.39	Poor	Fair	+	132	05	244	HGMI	50.52	60.63	Good	Good	/	137	06
212	HGMI	22.57	29.63	Fair	Fair	/	119	05	245	HGMI	85.07	80.91	Excellent	Excellent	/	167	06
213	HGMI	27.15	26.32	Fair	Fair	/	136	06	246	HGMI	27.32	28.23	Fair	Fair	/	120	06
214	HGMI	73.80	74.81	Excellent	Excellent	/	169	06	247	HGMI	45.96	39.80	Good	Fair	—	138	06
215	HGMI	75.78	77.04	Excellent	Excellent	/	162	06	248	HGMI	28.75	26.75	Fair	Fair	/	140	06
216	HGMI	50.59	56.74	Good	Good	/	144	06	249	HGMI	20.45	30.62	Poor	Fair	+	130	06
217	HGMI	59.03	71.13	Good	Excellent	+	128	06	250	HGMI	42.81	54.06	Good	Good	/	158	06
218	HGMI	17.17	25.52	Poor	Fair	+	107	06	251	HGMI	31.27	23.67	Fair	Fair	/	146	06
219	HGMI	8.61	16.71	Poor	Poor	/	169	06	252	HGMI	70.95	71.21	Excellent	Excellent	/	166	06
220	HGMI	12.62	15.71	Poor	Poor	/	145	06	253	HGMI	30.07	22.31	Fair	Fair	/	113	06
221	HGMI	23.53	25.32	Fair	Fair	/	114	06	254	HGMI	36.35	37.92	Fair	Fair	/	154	06
222	HGMI	14.87	18.70	Poor	Poor	/	128	06	255	HGMI	34.93	51.67	Fair	Good	+	166	03
223	HGMI	6.62	9.99	Poor	Poor	/	134	06	255C	HGMI	18.62	20.05	Poor	Poor	/	123	03
224	HGMI	32.70	17.81	Fair	Poor	—	147	06	255D	HGMI	75.74	60.47	Excellent	Good	—	146	03
225	HGMI	30.78	44.86	Fair	Good	+	143	06	256	HGMI	24.06	21.09	Fair	Fair	/	124	03
226	HGMI	31.10	49.05	Fair	Good	+	160	06	256A	HGMI	28.21	35.97	Fair	Fair	/	125	03
227	HGMI	15.92	5.15	Poor	Poor	/	103	06	257	HGMI	30.53	51.13	Fair	Good	+	140	03
227A	HGMI	26.94	23.52	Fair	Fair	/	125	06	258	HGMI	38.56	44.08	Fair	Good	+	110	03
228	HGMI	32.86	19.25	Fair	Poor	—	87	06	259	HGMI	77.81	57.38	Excellent	Good	—	162	03
229	HGMI	21.34	20.47	Fair	Poor	—	124	06	260	HGMI	61.52	87.91	Good	Excellent	+	167	03
230	HGMI	28.48	17.93	Fair	Poor	—	117	06	261	HGMI	31.53	38.64	Fair	Fair	/	137	03
231	HGMI	17.07	15.20	Poor	Poor	/	99	06	262	HGMI	35.11	47.98	Fair	Good	+	158	03
231A	HGMI	18.60	20.37	Poor	Poor	/	98	06	263	HGMI	24.15	12.36	Fair	Poor	—	128	03
231C	HGMI	25.66	nd	Fair	no sample	nd	nd	06	264	HGMI	51.84	29.99	Good	Fair	—	159	03
231D	HGMI	26.54	30.90	Fair	Fair	/	138	06	265	HGMI	52.50	60.94	Good	Good	/	132	03
231E	HGMI	41.05	26.13	Fair	Fair	/	149	06	266	HGMI	41.44	14.11	Fair	Poor	—	100	03
232	HGMI	67.82	49.25	Excellent	Good	—	145	06	267	HGMI	38.37	29.83	Fair	Fair	/	146	03
233	HGMI	46.43	52.05	Good	Good	/	128	06	268	HGMI	16.32	22.42	Poor	Fair	+	138	03
234	HGMI	30.92	38.48	Fair	Fair	/	129	06	269	HGMI	9.18	16.36	Poor	Poor	/	97	03
234A	HGMI	33.57	41.32	Fair	Fair	/	140	06	270	HGMI	14.30	27.82	Poor	Fair	+	124	03
235	HGMI	30.16	29.02	Fair	Fair	/	135	06	271	HGMI	12.22	9.94	Poor	Poor	/	83	04
236	HGMI	15.78	7.67	Poor	Poor	/	130	06	272	HGMI	30.65	34.75	Fair	Fair	/	120	04
237	HGMI	27.48	31.20	Fair	Fair	/	147	06	273	HGMI	21.18	25.30	Fair	Fair	/	125	04
238	HGMI	14.51	29.85	Poor	Fair	+	126	06	274	HGMI	29.31	27.45	Fair	Fair	/	146	04

NOTES:

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

nd   no data
+   indicates positive change in rating
—   indicates negative change in rating
/   indicates no change in rating

CPMI	Value	PMI	Value	HGMI	Value	Habitat Score	Value
Excellent	22.0-30.0	Excellent	63.0-100.0	Excellent	63.0-100.0	Optimal	160 - 200
Good	11.0-21.0	Good	56.0-62.99	Good	42.0-62.99	Sub-optimal	110 - 159
Fair	6.0-10.0	Fair	34.0-55.99	Fair	21.0-41.99	Marginal	60 - 109
Poor	0-5.99	Poor	0-33.99	Poor	0-20.99	Poor	<60

Table 2

Comparative Scores / Ratings (see notes)

Watershed Management Areas 3, 4, 5, and 6

Station	Index name	Rnd 3 Score	Rnd 4 Score	Rnd 3 Rating	Rnd 4 Rating	Change in Rating	Rnd 4 Habitat Score	WMA	Station	Index name	Rnd 3 Score	Rnd 4 Score	Rnd 3 Rating	Rnd 4 Rating	Change in Rating	Rnd 4 Habitat Score	WMA
274A	HGMI	22.54	27.61	Fair	Fair	/	104	06									
275	HGMI	19.72	23.52	Poor	Fair	+	112	04									
275A	HGMI	22.40	33.23	Fair	Fair	/	132	04									
276	HGMI	23.01	16.77	Fair	Poor	—	129	04									
277	HGMI	24.54	24.55	Fair	Fair	/	128	04									
277A	HGMI	35.25	26.97	Fair	Fair	/	118	04									
278	HGMI	12.99	20.01	Poor	Poor	/	103	04									
279	HGMI	44.08	47.04	Good	Good	/	140	04									
280	HGMI	41.13	44.65	Fair	Good	+	118	04									
281	HGMI	43.35	31.19	Good	Fair	—	96	04									
282	HGMI	30.22	29.89	Fair	Fair	/	145	04									
283	HGMI	29.08	23.27	Fair	Fair	/	154	04									
284	HGMI	29.66	35.48	Fair	Fair	/	130	04									
285	HGMI	44.62	36.21	Good	Fair	—	148	04									
286	HGMI	37.49	30.67	Fair	Fair	/	154	04									
287	HGMI	22.37	32.53	Fair	Fair	/	140	04									
288	HGMI	21.44	22.38	Fair	Fair	/	92	04									
289	HGMI	24.50	19.50	Fair	Poor	—	110	04									
290	HGMI	15.56	24.87	Poor	Fair	+	110	04									
291	HGMI	24.74	29.26	Fair	Fair	/	129	04									
292	HGMI	13.05	25.28	Poor	Fair	+	126	04									
292A	HGMI	11.15	20.25	Poor	Poor	/	101	04									
292O	HGMI	nd	28.31	no sample	Fair	nd	151	04									

NOTES:

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

nd   no data
+   indicates positive change in rating
—   indicates negative change in rating
/   indicates no change in rating

CPMI	Value	PMI	Value	HGMI	Value	Habitat Score	Value
Excellent	22.0-30.0	Excellent	63.0-100.0	Excellent	63.0-100.0	Optimal	160 - 200
Good	11.0-21.0	Good	56.0-62.99	Good	42.0-62.99	Sub-optimal	110 - 159
Fair	6.0-10.0	Fair	34.0-55.99	Fair	21.0-41.99	Marginal	60 - 109
Poor	0-5.99	Poor	0-33.99	Poor	0-20.99	Poor	<60

Table 3

Macroinvertebrate Abnormalities (see notes)

Watershed Management Areas 3, 4, 5, and 6

Station	Round 3	Round 4	WMA			Station	Round 3	Round 4	WMA				
205		2/89	05										
207	**+2**	**1/36**	05										
208		1/68	05										
209	**+1**	**1/55**	05										
211	2/44		05										
218		1/34	06										
219	+2		06										
223		2/24	06										
224		+1	06										
225	+1		06										
226	**+1**	**+1**	06										
227	+1		06										
227A		1/9	06										
229		1/13	06										
231A	1/15		06										
237	+1		06										
238	+1		06										
244	+1		06										
250	+1		06										
272	1/10		04										
274	+1		04										
274A		+3	06										
279	+1		04										
280	1/29		04										
288	+1		04										
292		+1	04										
292A	+1		04										
293	2/34		04										

NOTES:

chironomids with deformities / # chironomids examined

+ — indicates the number of non-chironomids having abnormalities

abnormalities are considered chronic if they appear in both the Round 3 and the Round 4 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 <u>not</u> new fall and <u>not</u> 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	200
SUB-OPTIMAL	110	159
MARGINAL	60	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 <u>not</u> new fall and <u>not</u> 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	200
SUB-OPTIMAL	110	159
MARGINAL	60	109
POOR	< 60	

Appendix A — Station Numbers and Locations for the Round 4 Northeast Region AMNET Study

Site	Stream	Latitude Longitude	Watershed Management Area
AN0205	Hackensack River	41 00'44.424"N 74 00'30.309"W	5
AN0206	Musquapsink Bk	40 59'32.334"N 74 01'23.666"W	5
AN0207	Pascack Bk	40 59'34.383"N 74 01'16.377"W	5
AN0208	Dwars Kill	40 58'35.789"N 73 56'03.629"W	5
AN0209	Tenakill Bk	40 58'42.631"N 73 58'02.310"W	5
AN0210	Dorotockeys Run	40 59'04.68"N 73 58'26.9"W	5
AN0211	Van Saun Bk	40 54'39.982"N 74 02'23.981"W	5
AN0212	Overpeck Ck	40 54'23.957"N 73 58'08.911"W	5
AN0213	Passaic River	40 46'18.419"N 74 34'11.609"W	6
AN0214	Indian Grave Bk	40 44'29.142"N 74 33'04.278"W	6
AN0215	Primrose Bk	40 46'05.653"N 74 32'02.405"W	6
AN0216	Primrose Bk	40 43'43.275"N 74 30'55.475"W	6
AN0217	Great Bk	40 46'04.205"N 74 30'22.521"W	6
AN0218	Great Bk	40 46'27.754"N 74 28'33.747"W	6
AN0219	Great Bk	40 43'30.447"N 74 28'26.628"W	6
AN0220	Loantaka Bk	40 46'18.454"N 74 27'38.650"W	6
AN0221	Loantaka Bk	40 44'18.732"N 74 26'45.324"W	6
AN0222	Black Bk	40 44'12.731"N 74 25'21.871"W	6
AN0223	Black Bk	40 42'04.382"N 74 28'33.316"W	6
AN0224	Passaic River	40 39'53.202"N 74 31'46.870"W	6
AN0225	UNT to Dead River	40 39'36.389"N 74 35'38.236"W	6
AN0226	Dead River	40 39'33.466"N 74 35'35.139"W	6
AN0227	Dead River	40 38'59.057"N 74 31'27.144"W	6
AN0227A	Harrison Bk	40 39'32.735"N 74 34'29.289"W	6
AN0228	Passaic River	40 39'40.260"N 74 29'38.065"W	6
AN0229	Passaic River	40 43'33.889"N 74 23'23.214"W	6
AN0230	Passaic River	40 44'03.526"N 74 22'39.059"W	6
AN0231	Passaic River	40 49'39.456"N 74 20'06.290"W	6
AN0231A	Passaic River	40 45'20.634"N 74 21'41.356"W	6
AN0231C	Slough Bk	40 45'30.980"N 74 20'54.443"W	6
AN0231D	Canoe Bk	40 44'55.573"N 74 20'13.149"W	6
AN0231E	Canoe Bk	40 48'05.809"N 74 17'54.170"W	6
AN0232	UNT to Whippany River (Dismal Bk)	40 48'43.679"N 74 34'09.368"W	6
AN0233	Whippany River	40 47'48.489"N 74 31'47.506"W	6
AN0234	Whippany River	40 48'04.916"N 74 27'58.620"W	6
AN0234A	Watnong Bk	40 48'50.455"N 74 29'36.866"W	6
AN0235	Whippany River	40 49'10.367"N 74 26'24.612"W	6
AN0236	Troy Bk	40 52'59.109"N 74 26'40.924"W	6
AN0237	Troy Bk	40 51'15.858"N 74 23'23.564"W	6
AN0238	Whippany River	40 50'43.120"N 74 20'49.381"W	6
AN0238B	Malapardis Bk	40 49'26.015"N 74 25'09.852"W	6
AN0239	Russia Bk	41 01'11.005"N 74 31'39.196"W	6
AN0240	Rockaway River	40 58'37.202"N 74 32'48.873"W	6
AN0241	Rockaway River	40 57'15.173"N 74 34'14.745"W	6
AN0242	Green Pond Bk	40 54'15.750"N 74 34'04.203"W	6
AN0243	Rockaway River	40 52'48.985"N 74 32'00.567"W	6
AN0244	Mill Bk	40 52'43.577"N 74 31'31.161"W	6
AN0245	Beaver Bk	40 56'49.054"N 74 27'37.127"W	6

Appendix A — Station Numbers and Locations for the Round 4 Northeast Region AMNET Study

Site	Stream	Latitude Longitude	Watershed Management Area	Site	Stream	Latitude Longitude	Watershed Management Area
AN0246	Beaver Bk	40 54'22.084"N 74 29'49.401"W	6	AN0267	Ramapo River	41 02'12.046"N 74 14'28.614"W	3
AN0247	Den Bk	40 52'06.634"N 74 31'01.902"W	6	AN0268	Pompton River	40 56'36.232"N 74 16'46.240"W	3
AN0248	Rockaway River	40 53'39.724"N 74 27'47.249"W	6	AN0269	Dam Bk Trib to Pompton River	40 55'35.622"N 74 17'35.084"W	3
AN0249	Stony Bk	40 55'43.882"N 74 26'15.152"W	6	AN0270	Packanack Bk	40 55'58.902"N 74 15'10.028"W	3
AN0250	Rockaway River	40 54'10.719"N 74 24'35.581"W	6	AN0271	Deepavaal Bk	40 53'15.211"N 74 15'58.704"W	4
AN0251	Rockaway River	40 53'57.626"N 74 23'17.715"W	6	AN0272	Preakness Bk (Singac Bk)	40 57'26.544"N 74 13'30.102"W	4
AN0252	Crooked Bk	40 56'19.068"N 74 22'16.683"W	6	AN0273	Preakness Bk	40 54'41.64"N 74 14'48.18"W	4
AN0253	Crooked Bk	40 55'36.438"N 74 22'37.966"W	6	AN0274	Passaic River	40 53'14.912"N 74 13'25.448"W	4
AN0254	Crooked Bk	40 53'24.860"N 74 22'24.849"W	6	AN0274A	Passaic River	40 54'03.477"N 74 20'12.800"W	6
AN0255	Wanaque River	41 09'48.768"N 74 18'59.963"W	3	AN0275	Peckman River	40 53'31.397"N 74 12'41.327"W	4
AN0255C	Belcher Ck	41 08'15.049"N 74 22'03.055"W	3	AN0275A	Peckman River	40 50'53.502"N 74 14'03.492"W	4
AN0255D	Green Bk	41 09'09.430"N 74 21'31.994"W	3	AN0276	Molly Ann Bk	40 54'52.118"N 74 11'25.389"W	4
AN0256	Wanaque River	41 02'13.395"N 74 17'09.206"W	3	AN0277	Goffle Bk	40 56'20.372"N 74 09'46.300"W	4
AN0256A	Meadow Bk	41 02'34.067"N 74 17'08.645"W	3	AN0277A	Goffle Bk	40 58'56.275"N 74 08'20.550"W	4
AN0257	Wanaque River	41 00'26.460"N 74 17'31.708"W	3	AN0278	Diamond Bk	40 56'52.111"N 74 08'31.064"W	4
AN0258	Pequannock River	41 06'54.993"N 74 30'49.449"W	3	AN0279	Saddle R	41 04'16.047"N 74 05'17.748"W	4
AN0259	Pequannock River	41 04'41.002"N 74 29'20.652"W	3	AN0280	W Br Saddle River	41 04'24.602"N 74 05'55.421"W	4
AN0260	Mossmans Bk	41 06'24.964"N 74 26'03.736"W	3	AN0281	Saddle R	41 01'54.907"N 74 06'00.568"W	4
AN0261	Clinton Bk	41 03'34.928"N 74 26'25.673"W	3	AN0282	Saddle R	40 58'21.366"N 74 05'32.790"W	4
AN0262	Kanouse Bk	41 02'50.422"N 74 25'47.944"W	3	AN0283	Hohokus Bk	41 01'33.447"N 74 11'36.944"W	4
AN0263	Macopin River	41 02'53.761"N 74 24'21.876"W	3	AN0284	Valentine Bk (Hohokus Bk)	41 01'53.561"N 74 09'08.922"W	4
AN0264	Pequannock River	41 01'06.436"N 74 24'03.801"W	3	AN0285	Hohokus Bk	41 01'28.052"N 74 08'11.471"W	4
AN0265	Pequannock River	41 00'12.371"N 74 20'06.616"W	3	AN0286	Ramsey Bk	41 04'54.667"N 74 07'22.352"W	4
AN0266	Ramapo River	41 05'48.439"N 74 09'55.599"W	3	AN0287	Ramsey Bk	41 01'29.913"N 74 08'09.515"W	4

Appendix A — Station Numbers and Locations for the Round 4 Northeast Region AMNET Study

Site	Stream	Latitude Longitude	Watershed Management Area		Site	Stream	Latitude Longitude	Watershed Management Area
AN0288	Hohokus Bk	40 58'24.684"N 74 06'30.629"W	4					
AN0289	Saddle R	40 56'46.710"N 74 05'55.372"W	4					
AN0290	Saddle R	40 54'12.847"N 74 04'52.155"W	4					
AN0291	Saddle R	40 51'50.717"N 74 06'05.631"W	4					
AN0292	Third River	40 49'35.858"N 74 08'29.920"W	4					
AN0292A	Third River	40 49'59.514"N 74 10'48.078"W	4					
AN0292O	Passaic River	40 52'56.729"N 74 07'22.742"W	4					

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)
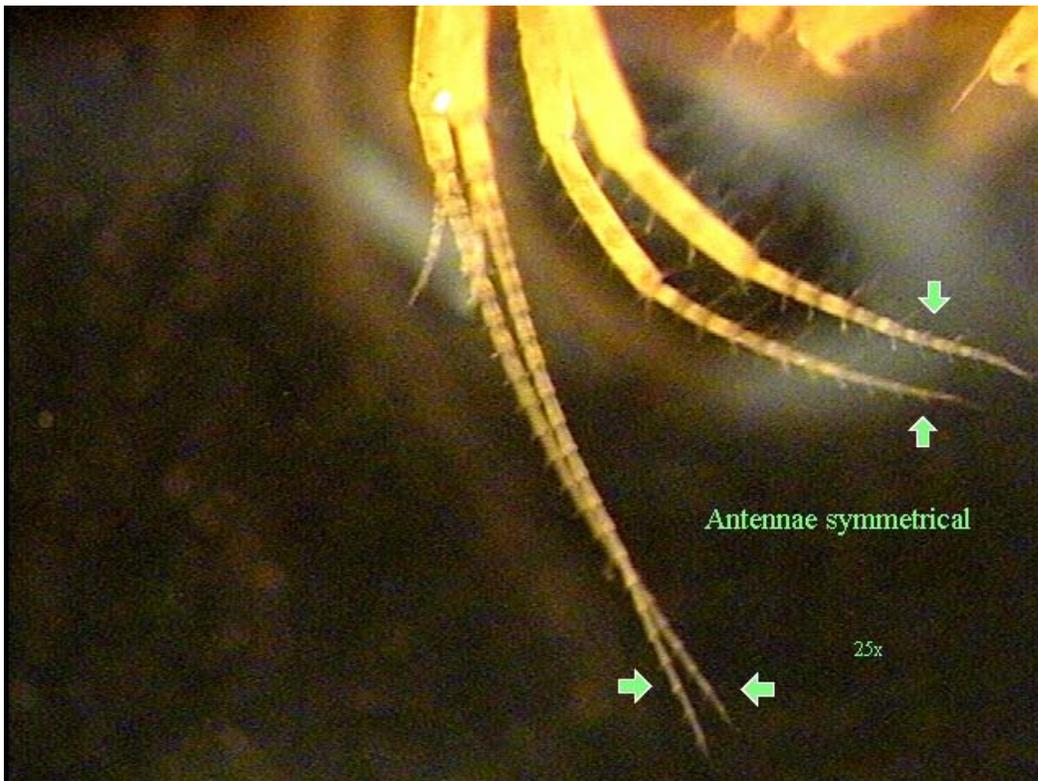
Chironomus species with mentum abnormality
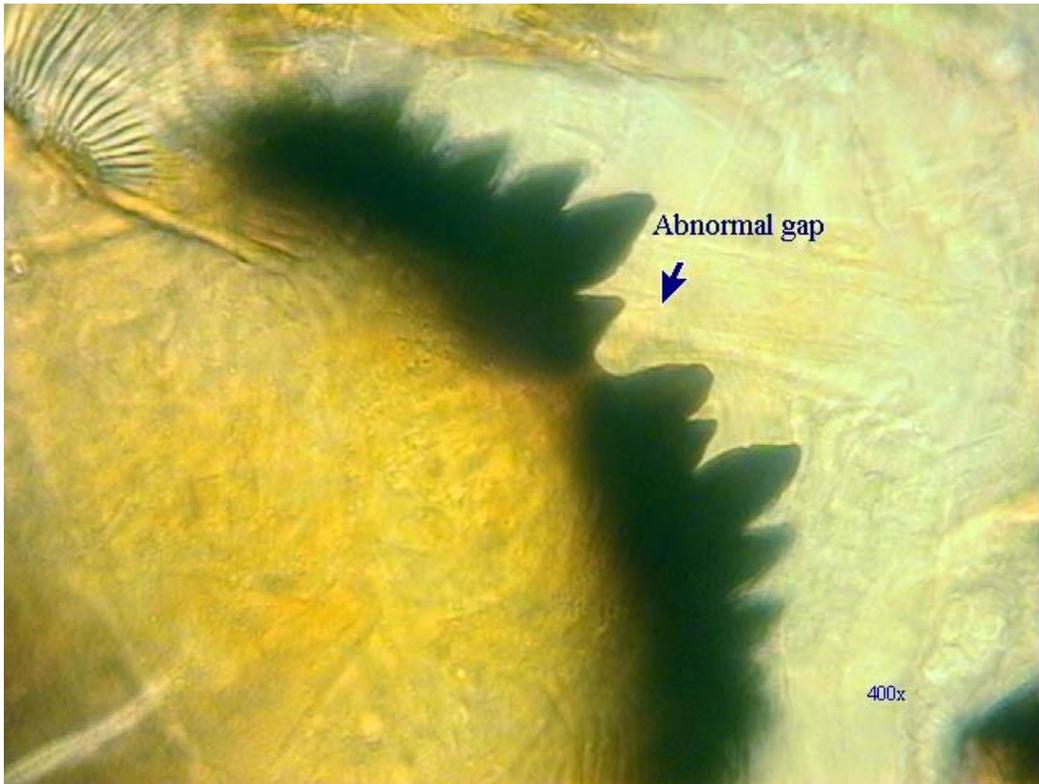
Chironomus species with normal mentum
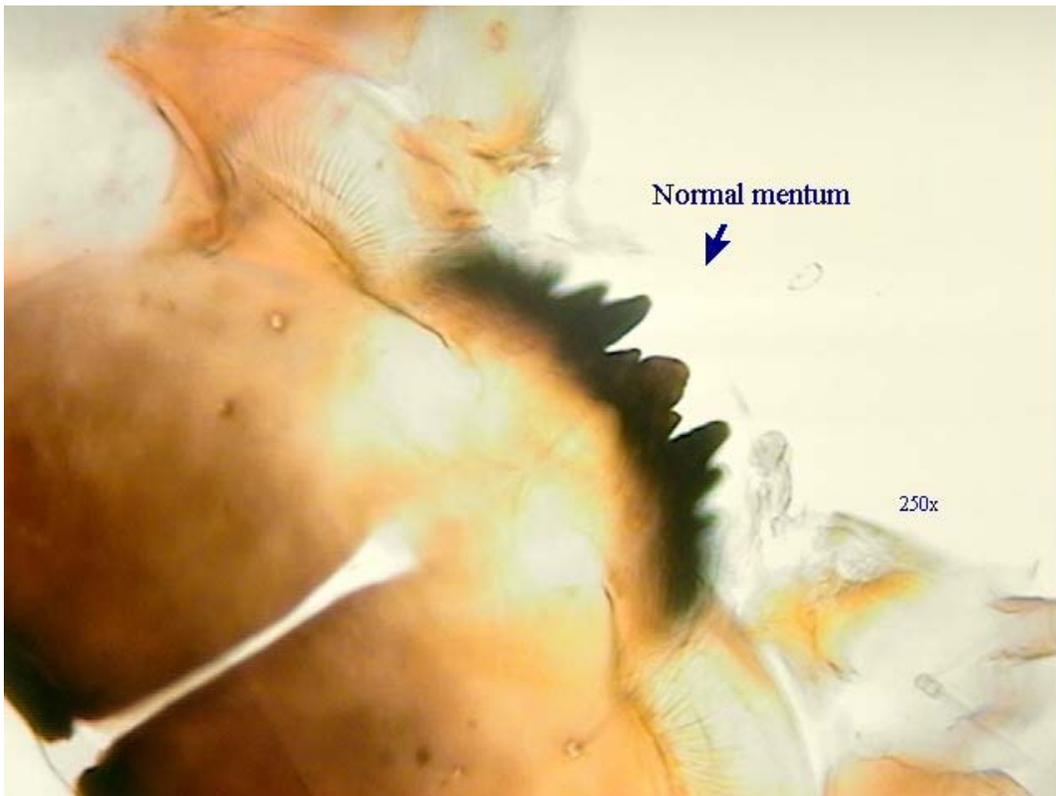
Procladius species with abnormal ligula
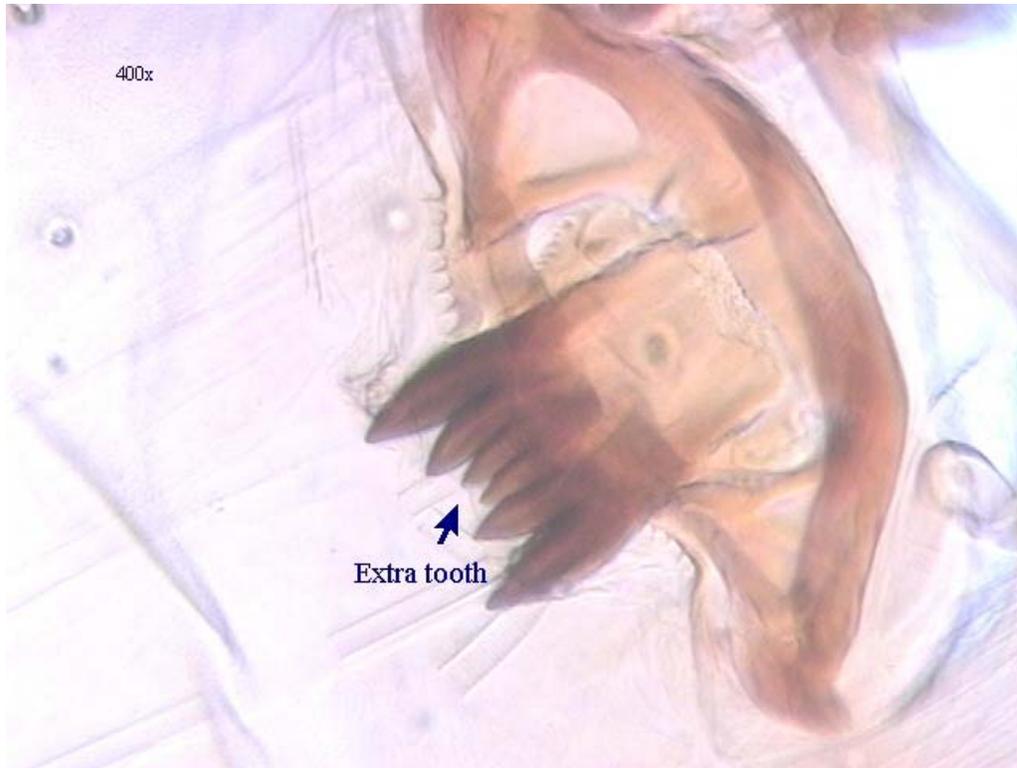
Procladius species with normal ligula
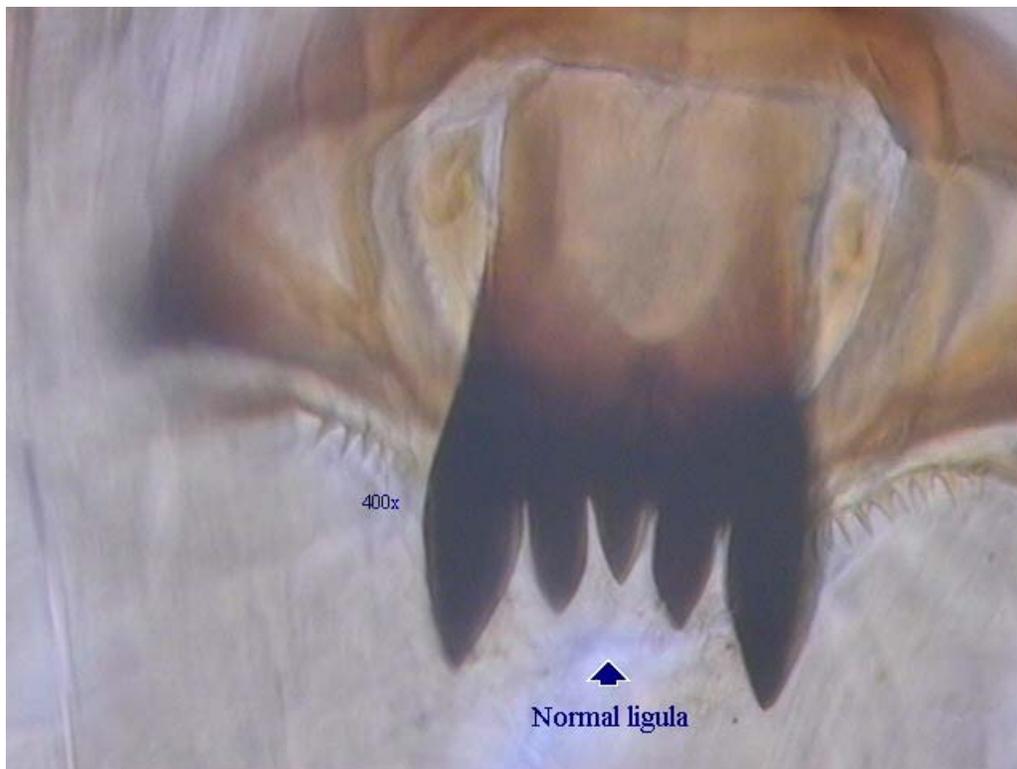
Polypedilum species with abnormal mentum

Polypedilum species with normal mentum
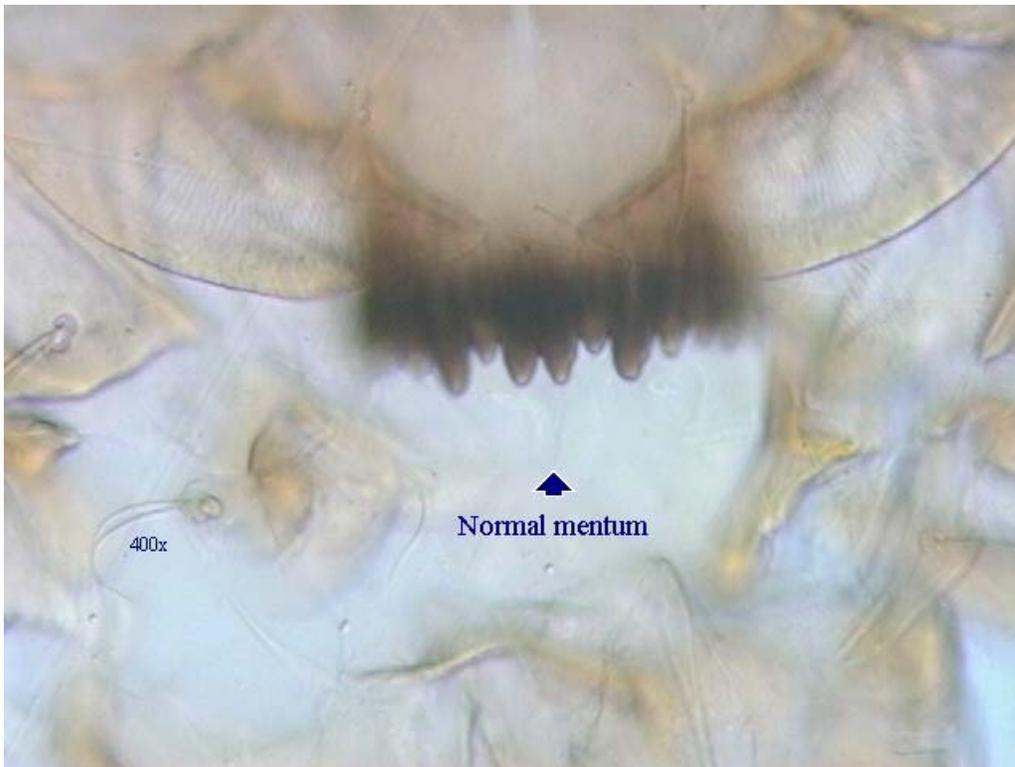
APPENDIX C

Graphical Comparison of Habitat Assessment Scores versus Biological Assessment Ratings from the Round 4 Northeast Water Region AMNET Study

Comparative Scores of
Biological Assessment Rating vs. Habitat Score
WMA 3
Round 4

Biological Assessment Rating

Excellent

Good

Fair

Poor

$R^2 = 0.4486$

Habitat Score

75   100   125   150   175   200
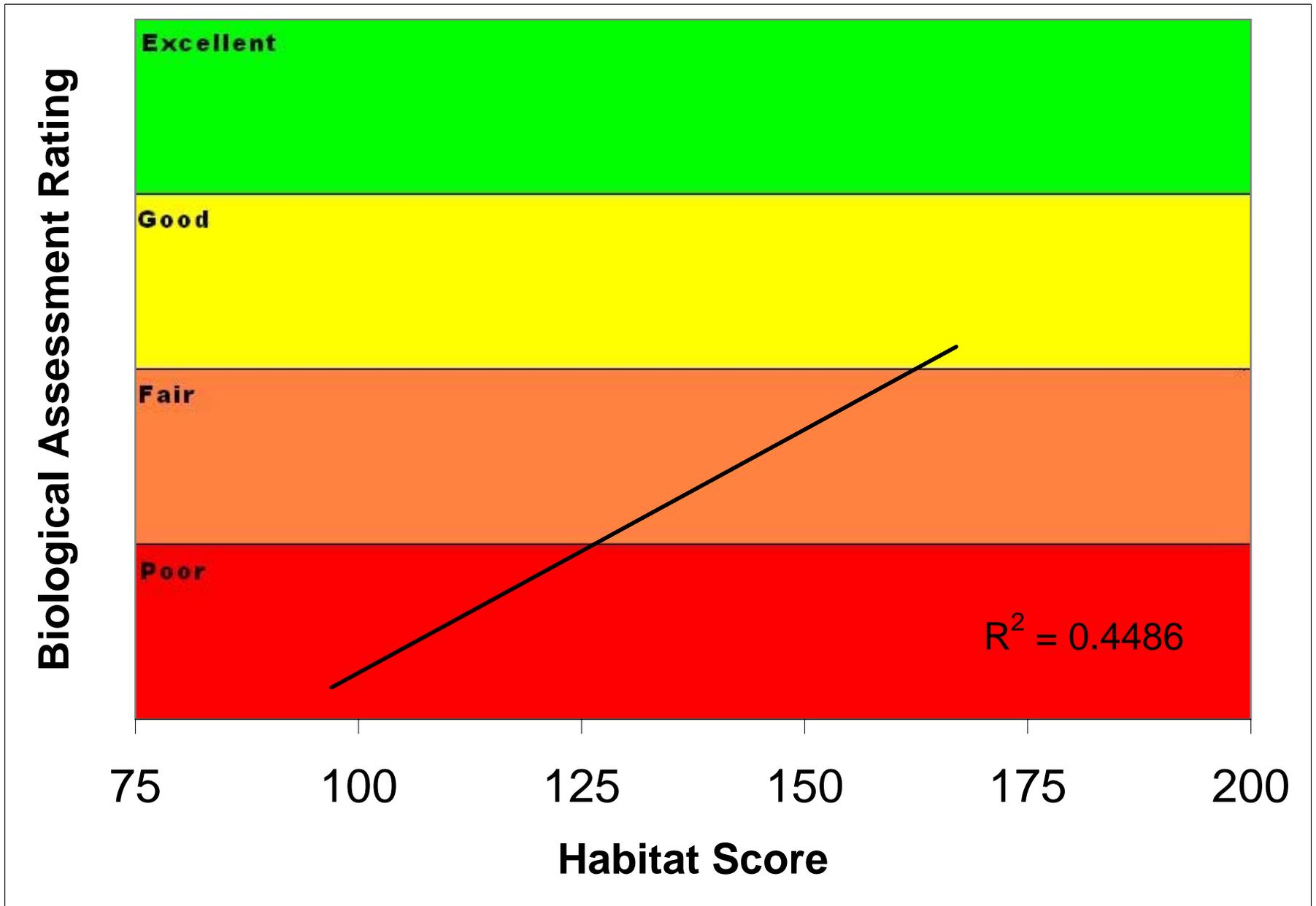
Comparative Scores of
Biological Assessment Rating vs. Habitat Score
WMA 4
Round 4

Biological Assessment Rating

Excellent

Good

Fair

Poor

$R^2 = 0.1721$
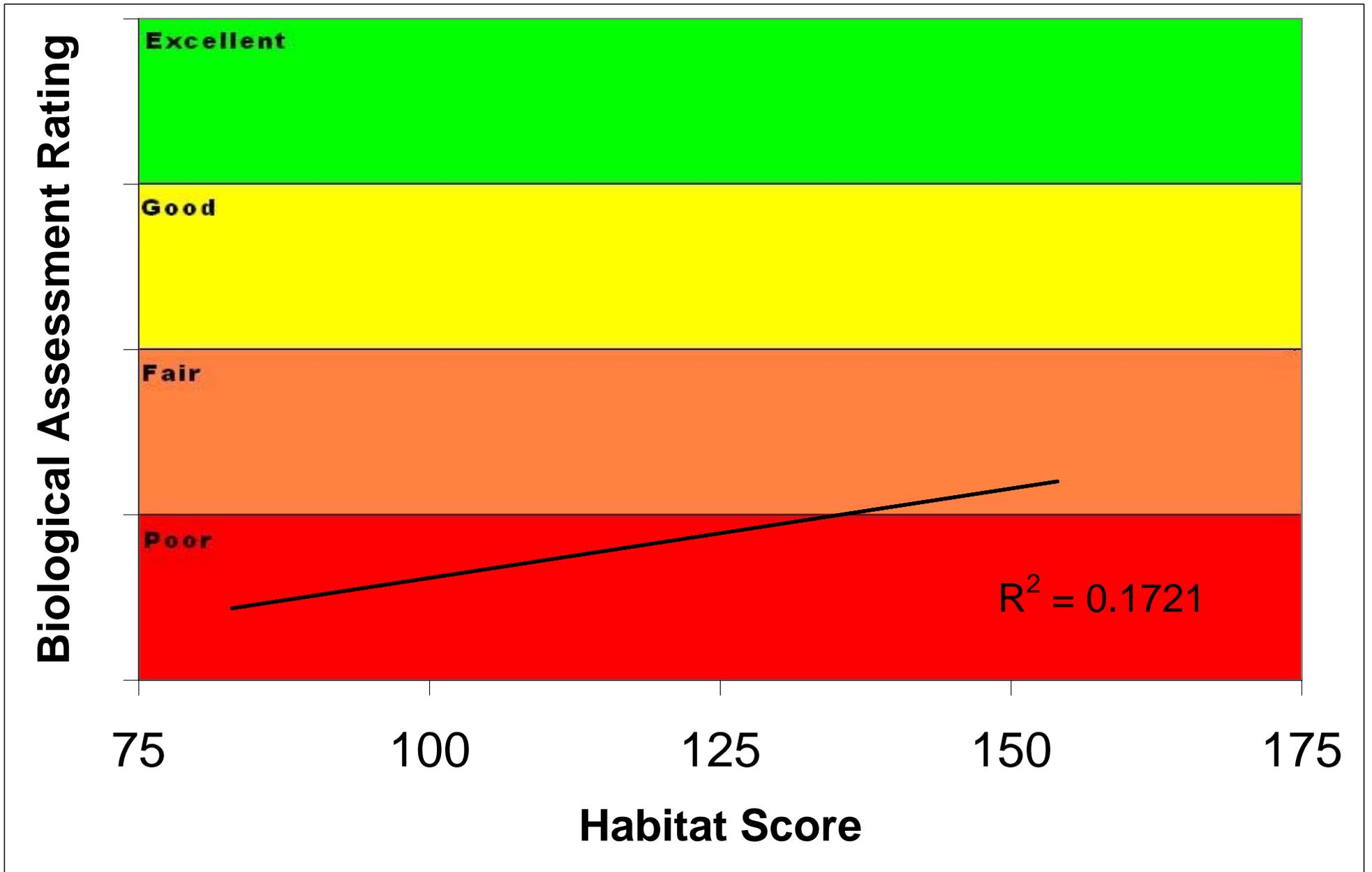
Habitat Score

Comparative Scores of
Biological Assessment Rating vs. Habitat Score
WMA 5
Round 4

Biological Assessment Rating

Excellent

Good

Fair

Poor

$R^2 = 0.0042$

Habitat Score

75   100   125   150
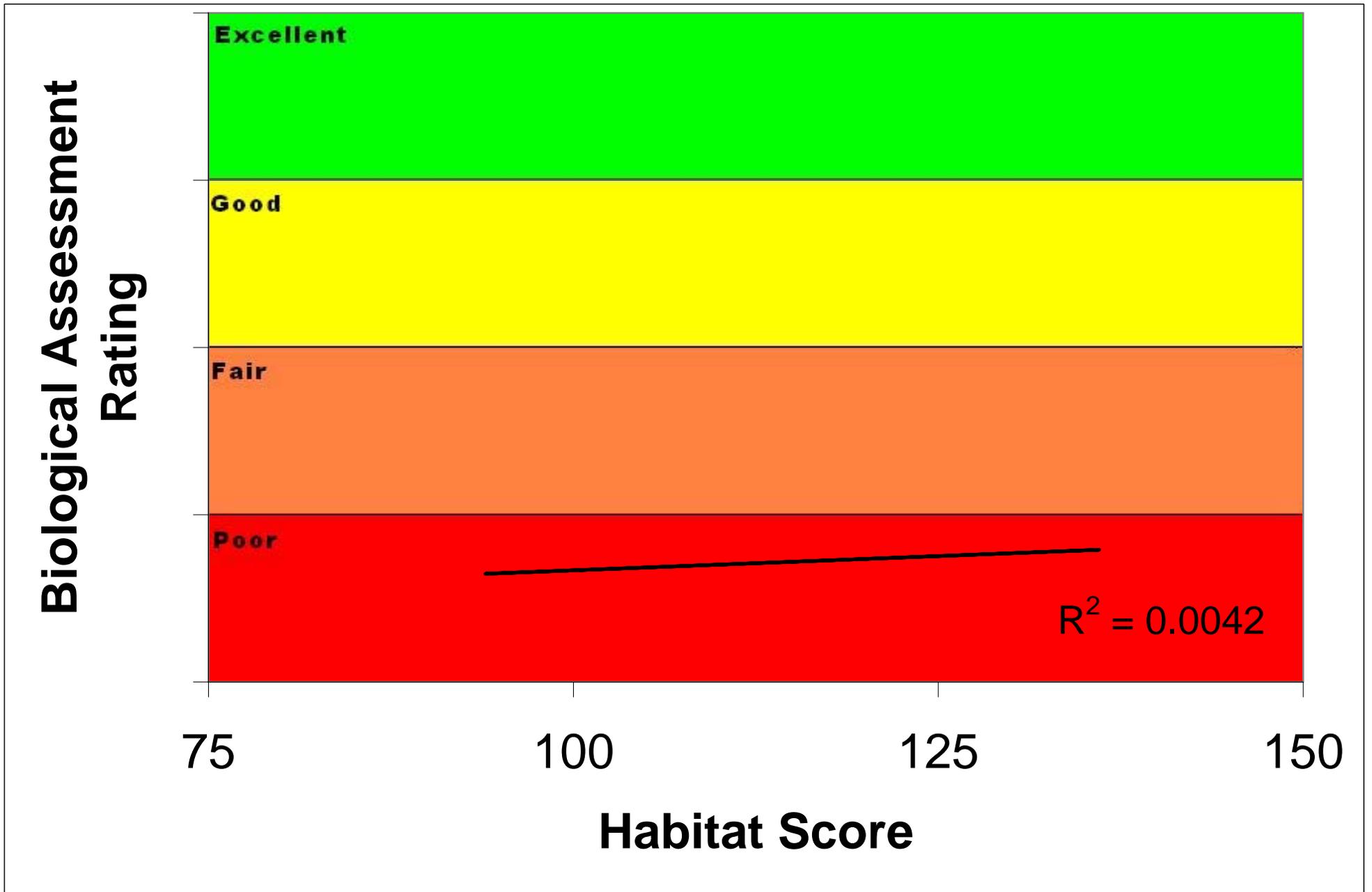
Comparative Scores of
Biological Assessment Rating vs. Habitat Score
WMA 6
Round 4

Biological Assessment Rating

Excellent

Good

Fair

Poor

$R^2 = 0.2434$

Habitat Score

75   100   125   150   175   200
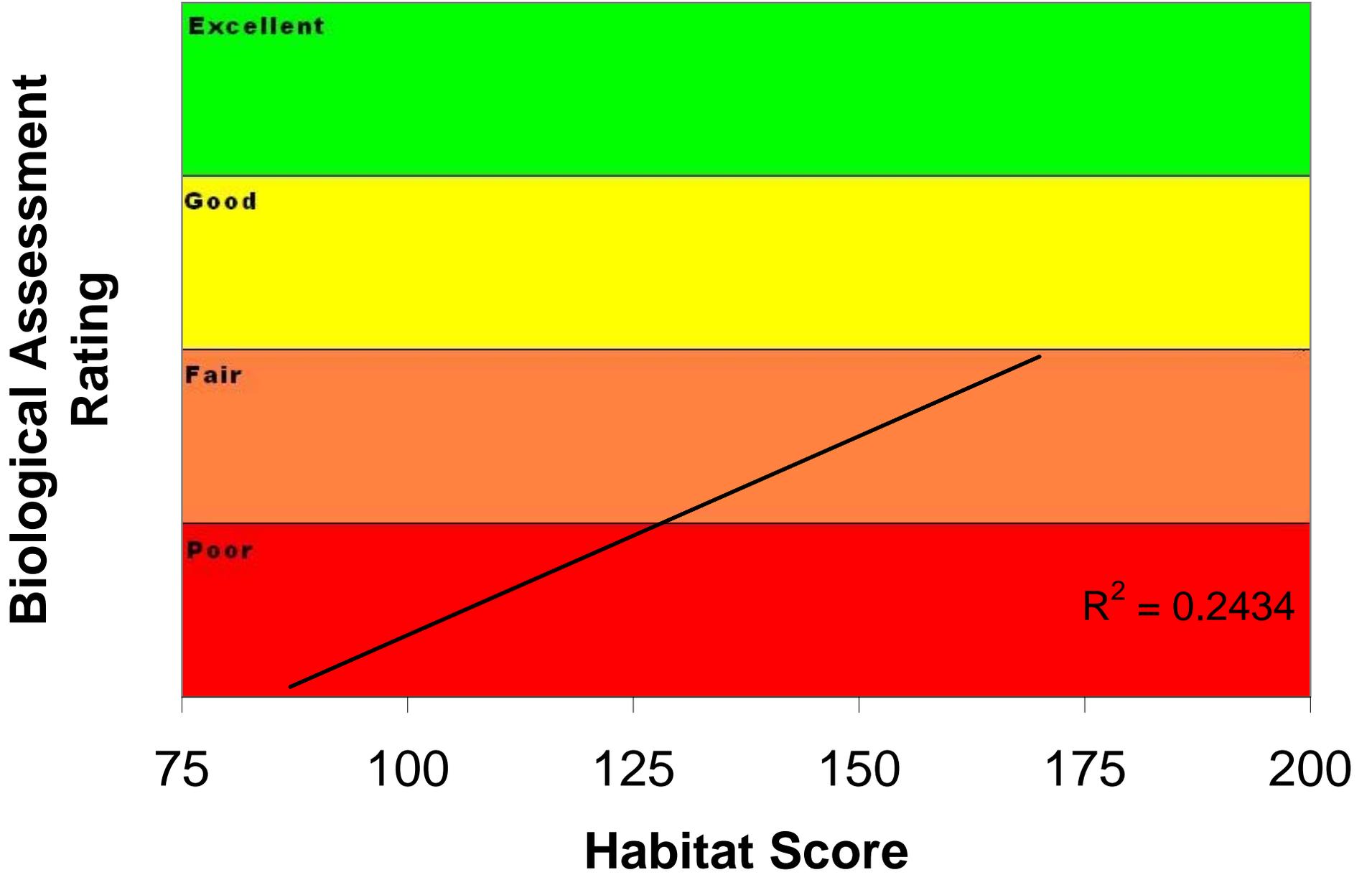
Comparative Scores of
Biological Assessment Rating vs. Habitat Score
Combined
Round 4

Biological Assessment Rating

Excellent

Good

Fair

Poor

$R^2 = 0.2644$

Habitat Score

75   100   125   150   175   200
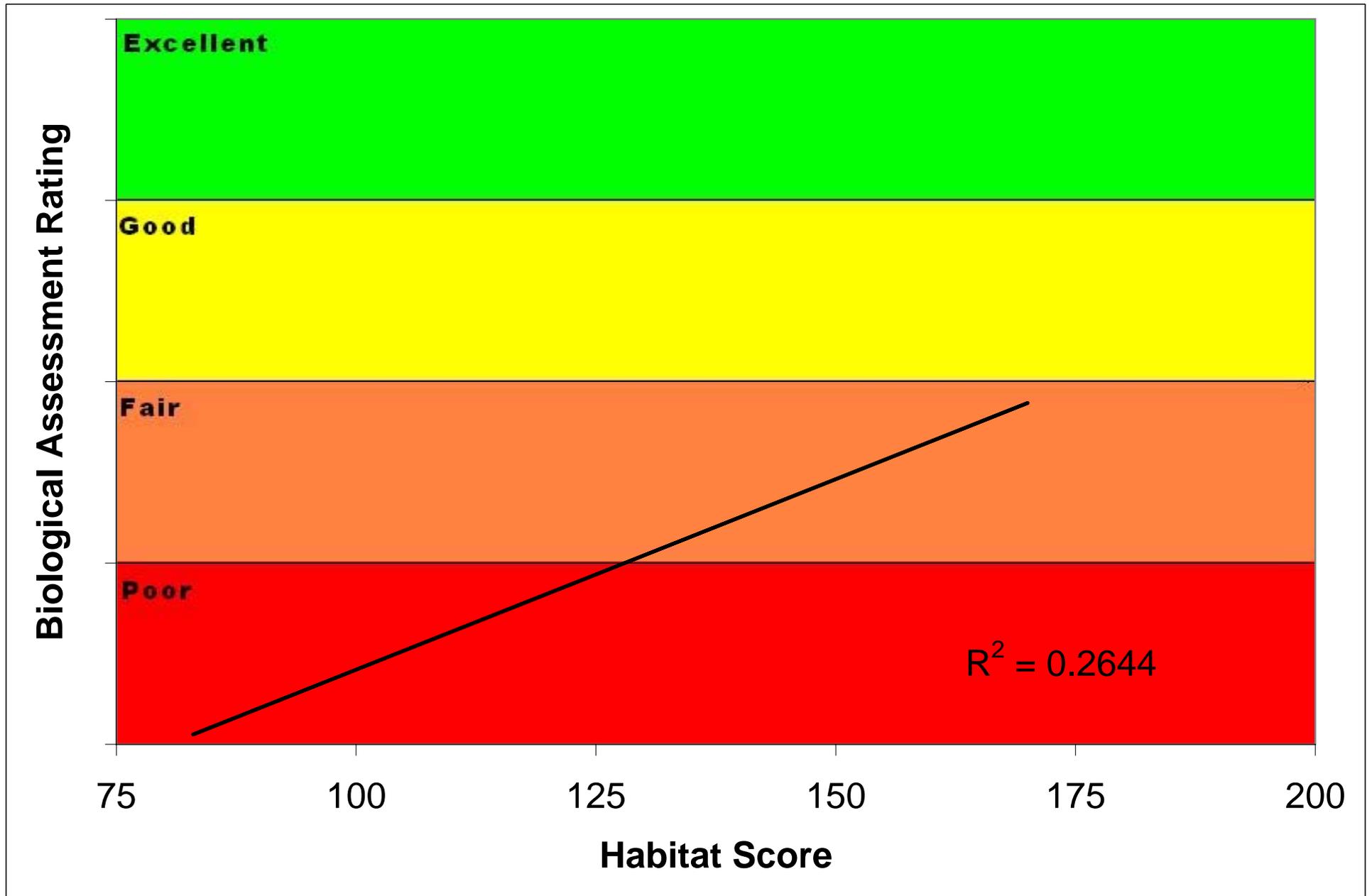
APPENDIX D

Taxonomic and Statistical Data, Biological Assessments, Habitat Assessment Scores and Observations from the
Round 4 Northeast Water Region AMNET Study
(Site numbers, locations, sample dates, and USGS topographic quadrangle, top of page.)

Notes/Definitions:

Statistical data includes those biometric results that are applied to the following ratings.

CPMI	PMI	HGMI
1. Total # of Taxa 2. # of EPT taxa 3. % Ephemeroptera 4. Hilsenhoff Biotic Index (HBI) 5. % clingers	1. Insect taxa 2. Non-insect taxa 3. % Plecoptera + Trichoptera 4. % Diptera excluding Tanytarsini 5. % Mollusca + Amphipoda 6. Beck's Biotic Index (BBI) 7. % filterers	1. # of genera 2. % non-insect genera 3. % sensitive EPT 4. # of scraper genera 5. Hilsenhoff Biotic Index (HBI) 6. # of Attribute 2 genera 7. # of Attribute 3 genera

See METHODS, Table 1, Volume 1.

Other notes:

1. Ck – Creek, Bk – Brook, Br – Branch, R – River, UNT – un-named tributary
2. 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.

Genus	Tolerance Value	Amount
Glyptotendipes	10	40
Polypedilum	6	18
Rheotanytarsus	6	17
Caecidotea	8	4
Microtendipes	7	4
Tanytarsus	6	4
* Cheumatopsyche	5	2
Gammarus	6	2
Ablabesmyia	8	1
Branchiura	10	1
Chironomus	10	1
Dicrotendipes	8	1
Nais	8	1
* Oecetis	8	1
Paratendipes	8	1
Stenelmis	5	1
Thienemanniella	6	1

* (EPT organism)   *Taxa Richness:* 17   *Population:* 100

Hilsenhoff Biotic Index (HBI): 7.87   *# Scrapers:* 1

% Sensitive EPT: 1.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 23.5%   *Attribute 3 genera:* 0

HGMI Rating: **20.08**   **Poor**

Habitat Analysis: 124   Suboptimal   USEPA Protocol

Observations: Water temp: 26.25 C; Cond: 470 umhos; DO: 5.52 mg/L; pH: 7.42 SU

Clarity: turbid, brown; Flow Rate: fast; Width/Depth: 52' / 2'; Substrate: cobble, silt

Canopy: mostly closed; Bank Stability: fair; Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: forested

Pipes / Ditches: storm sewers (flowing)

Other: fish

AMNET Site # **AN0206** **Stream Name:** **Musquapsink Bk**

Location: **Harrington Ave; Westwood Boro; Bergen County**

Collection Date: *7/31/2008* **USGS Topo Map:** **Hackensack**

Genus	Tolerance Value	Amount
Lirceus	8	25
Corbicula	4	14
Gammarus	6	12
Stictochironomus	9	10
Rheotanytarsus	6	8
Caecidotea	8	4
Polypedilum	6	4
Sphaerium	8	4
Enallagma	9	3
Cura	4	2
Limnodrilus	10	2
Stenelmis	5	2
Tanytarsus	6	2
Alboglossiphonia	8	1
Brillia	5	1
Corynoneura	4	1
Helisoma	7	1
Paratanytarsus	6	1
* Stenacron	4	1
Stylodrilus	10	1
Trichocorixa	9	1

(EPT organism) **Taxa Richness:** 21 *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.84 *# Scrapers:* 3

% Sensitive EPT: 1.0% *Attribute 2 genera:* 0

% Non-Insect Taxa: 47.6% *Attribute 3 genera:* 0

HGMI Rating: **18.67** **Poor**

Habitat Analysis: 130 Suboptimal USEPA Protocol

Observations: Water temp: 22.26 C; Cond: 562 umhos; DO: 7.28 mg/L; pH: 7.43 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 40' / 1'; Substrate: cobble, gravel, sand

Canopy: mostly closed; Bank Stability: fair; Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream; Land Uses: suburban, forested

Other: crayfish, periphytes; adj to school playground

Genus	Tolerance Value	Amount
Caecidotea	8	26
Paratendipes	8	24
Lirceus	8	17
* Stenacron	4	8
Limnodrilus	10	7
Stictochironomus	9	5
Gammarus	6	4
Orconectes	6	2
Pisidium	6.8	2
Cladotanytarsus	7	1
Corbicula	4	1
Spirosperma	10	1
Stenelmis	5	1
Tanytarsus	6	1

* (EPT organism)   *Taxa Richness:* 14   *Population:* 100

Hilsenhoff Biotic Index (HBI):   7.65   *# Scrapers:* 2

% Sensitive EPT: 8.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 57.1%   *Attribute 3 genera:* 0

HGMI Rating: **11.56**   **Poor**

Habitat Analysis: 126   Suboptimal   USEPA Protocol

Observations: Water temp: 22.48 C; Cond: 540 umhos; DO: 6.54 mg/L; pH: 7.32 SU

Clarity: turbid, brown; Flow Rate: moderate;   Width/Depth: 45' / 3'; Substrate: cobble, undercut banks

Canopy: mostly closed; Bank Stability: good;   Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers

Other: fish, crayfish; weir, USGS gage: 1.7

AMNET Site # **AN0208**   **Stream Name:** **Dwars Kill**

Location: **end of Anderson Ave; Alpine Boro; Bergen County**

Collection Date: *7/10/2008*   **USGS Topo Map:** **Yonkers**

	Genus	Tolerance Value	Amount
	Paratendipes	8	24
	Phaenopsectra	7	11
	Chironomus	10	7
*	Dolophilodes	0	6
*	Lepidostoma	1	6
	Simulium	6	6
	Lumbriculus	8	5
	Micropsectra	7	4
*	Diplectrona	0	3
*	Psilotreta	0	3
*	Perlidae	1	2
	Polypedilum	6	2
*	Rhyacophila	1	2
	Tanypodinae	7	2
	Brillia	5	1
	Chelifera	6	1
	Eukiefferiella	8	1
	Gerridae	8	1
*	Leptoceridae	4	1
	Limonia	6	1
	Microtendipes	7	1
	Microvelia	6	1
	Nigronia	2	1
	Oulimnius	4	1
	Parametriocnemus	5	1
	Pisidium	6.8	1
*	Polycentropus	6	1
	Psephenus	4	1
	Stenelmis	5	1
	Tanytarsus	6	1
	Tvetenia	5	1

* (EPT organism)   *Taxa Richness:* 31   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.73   *# Scrapers:* 5

% Sensitive EPT: 24.0%   *Attribute 2 genera:* 5

% Non-Insect Taxa: 6.5%   *Attribute 3 genera:* 3

HGMI Rating: **55.26** **Good**

Habitat Analysis: 136   Suboptimal   USEPA Protocol

Observations: Water temp: 19.01 C; Cond: 120 umhos; DO: 6.74 mg/L; pH: 6.60 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 4' / <1'; Substrate: cobble, gravel

Canopy: closed; Bank Stability: fair; Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers

Other: fish, salamander, periphytes

	Genus	*Tolerance Value*	*Amount*
	Polypedilum	6	19
*	Cheumatopsyche	5	16
	Cricotopus	7	16
*	Baetis	6	7
	Simulium	6	6
	Limnodrilus	10	4
	Micropsectra	7	4
	Gammarus	6	3
	Thienemannimyia	6	3
	Cladotanytarsus	7	2
*	Hydropsyche	4	2
	Paratanytarsus	6	2
	Phaenopsectra	7	2
	Caecidotea	8	1
	Chironomus	10	1
*	Hydroptila	6	1
	Musculium	5	1
	Nais	8	1
	Parametriocnemus	5	1
	Paratendipes	8	1
	Physella	9.1	1
	Pristina	8	1
	Slavina	7	1
	Stenelmis	5	1
	Tanytarsus	6	1
	Tipula	4	1
	Tvetenia	5	1

(EPT organism)   *Taxa Richness:* 27   *Population:*   100

Hilsenhoff Biotic Index (HBI):   6.30   *# Scrapers:*   4

% Sensitive EPT: 8.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 29.6%   *Attribute 3 genera:*   3

HGMI Rating: **36.05**   **Fair**

Habitat Analysis: 132   Suboptimal   USEPA Protocol

Observations: Water temp: 22.20 C; Cond: 571 umhos;   DO: 6.61 mg/L; pH: 7.51 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 27' / 1'; Substrate: cobble, sand

Canopy: mostly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested, community park

Pipes / Ditches: storm sewers

Other: fish, crayfish, periphytes, filamentous algae; "trout stocked waters"

AMNET Site # AN0210   *Stream Name:* **Dorotockeys Run**

Location: **Closter Rd; Harrington Park Boro; Bergen County**

Collection Date: *7/31/2008*   *USGS Topo Map:* **Yonkers**

	Genus	Tolerance Value	Amount
	Caecidotea	8	16
	Stictochironomus	9	11
	Gammarus	6	10
*	Cheumatopsyche	5	8
	Lirceus	8	7
	Simulium	6	6
	Stenelmis	5	5
	Cricotopus	7	4
	Limnodrilus	10	4
*	Baetis	6	3
	Dugesia	4	3
	Ancyronyx	2	2
	Cladotanytarsus	7	2
	Lumbriculidae	8	2
	Micropsectra	7	2
	Parametriocnemus	5	2
	Physella	9.1	2
	Prostoma	7	2
	Antocha	3	1
	Glyptotendipes	10	1
*	Hydropsyche	4	1
	Ischnura	9	1
	Menetus	6	1
	Paratendipes	8	1
	Polypedilum	6	1
*	Stenacron	4	1
	Thienemannimyia	6	1

* (EPT organism)   *Taxa Richness:* 27   *Population:* 100

Hilsenhoff Biotic Index (HBI):   6.88   *# Scrapers:* 4

% Sensitive EPT: 4.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 33.3%   *Attribute 3 genera:* 2

HGMI Rating: **30.16**   **Fair**

Habitat Analysis: 94   Marginal   USEPA Protocol

Observations: Water temp: 21.85 C; Cond: 538 umhos;   DO: 7.20 mg/L; pH: 7.47 SU

Clarity: slightly turbid; Flow Rate: moderate;   Width/Depth: 21' / < 1'; Substrate: cobble, gravel, sand

Canopy: mostly closed; Bank Stability: poor;   Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Other: fish, crayfish, waterfowl, cormorant; trash, large blocks of wood creating dam

AMNET Site # **AN0211**   **Stream Name:** **Van Saun Bk**

Location: **Main St & Rt 4; Hackensack; Bergen County**

Collection Date: *7/10/2008*   **USGS Topo Map:** **Hackensack**

	Genus	Tolerance Value	Amount
*	Cheumatopsyche	5	27
	Polypedilum	6	21
	Tanytarsus	6	11
	Paratanytarsus	6	9
	Nais	8	8
	Rheotanytarsus	6	7
*	Hydropsyche	4	6
	Chironomus	10	2
	Limnodrilus	10	2
	Dicrotendipes	8	1
	Microtendipes	7	1
	Musculium	5	1
	Parametriocnemus	5	1
	Phaenopsectra	7	1
	Physella	9.1	1
	Pristina	8	1

(EPT organism)   *Taxa Richness:* 16   *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.00   *# Scrapers:* 2

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 31.3%   *Attribute 3 genera:* 1

HGMI Rating: **23.39** **Fair**

Habitat Analysis: 132 Suboptimal USEPA Protocol

Observations: Water temp: 19.02 C; Cond: 723 umhos; DO: 7.67 mg/L; pH: 7.60 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 43' /< 1'; Substrate: cobble, gravel, sand, mud

Canopy: mostly closed; Bank Stability: fair; Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream; Land Uses: urban, forested

Other: fish, frogs, periphytes, waterfowl; trash; USGS gage: 1.7

AMNET Site # AN0212   *Stream Name:* **Overpeck Ck**

Location: **Dean Dr; Englewood; Bergen County**

Collection Date: *7/10/2008*   *USGS Topo Map:* **Yonkers**

	Genus	*Tolerance Value*	*Amount*
	Nais	8	18
	Phaenopsectra	7	15
	Tanytarsus	6	9
	Simulium	6	8
	Prosimulium	2	6
	Eukiefferiella	8	5
	Hemerodromia	6	5
	Rheocricotopus	6	5
	Chironomus	10	4
	Polypedilum	6	4
*	Cheumatopsyche	5	3
	Dicrotendipes	8	3
*	Baetis	6	2
	Cnephia	4	2
	Slavina	7	2
	Tubificidae	10	2
	Cardiocladius	5	1
	Cura	4	1
	Enchytraeidae	10	1
*	Hydroptila	6	1
	Menetus	6	1
	Pentaneura	6	1
	Prostoma	7	1

* (EPT organism)   *Taxa Richness:*   23   *Population:*   100

Hilsenhoff Biotic Index (HBI):	6.64	*# Scrapers:* 3
% Sensitive EPT:	3.0%	*Attribute 2 genera:* 0
% Non-Insect Taxa:	30.4%	*Attribute 3 genera:* 3

HGMI Rating: **29.63**   **Fair**

Habitat Analysis: 119   Suboptimal   USEPA Protocol

Observations: Water temp: 19.86 C; Cond: 489 umhos; DO: 6.86 mg/L; pH: 7.38 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 31 ' / < 1'; Substrate: cobble, gravel, sand

Canopy: mostly closed; Bank Stability: fair;   Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: urban, suburban, cemetary

Pipes / Ditches: storm sewers flowing

Other: fish, periphytes, trash; channelized; downstream of large hospital and cemetary

AMNET Site # **AN0213**   *Stream Name:* **Passaic River**

Location: **Tempe Wicke Rd; Mendham Twp; Morris County**

Collection Date: *7/15/2008*   *USGS Topo Map:* **Mendham**

	Genus	Tolerance Value	Amount
	Stenelmis	5	54
*	Cheumatopsyche	5	9
	Dugesia	4	9
	Cura	4	7
*	Hydropsyche	4	5
*	Chimarra	4	3
*	Maccaffertium	3	3
	Polypedilum	6	3
	Eukiefferiella	8	2
	Musculium	5	2
	Gammarus	6	1
	Optioservus	4	1
	Rheotanytarsus	6	1

* (EPT organism)   *Taxa Richness:* 13   *Population:* 100

Hilsenhoff Biotic Index (HBI): 4.80   *# Scrapers:* 2

% Sensitive EPT: 6.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 30.8%   *Attribute 3 genera:* 1

HGMI Rating: **26.32**   **Fair**

Habitat Analysis: 136   Suboptimal   USEPA Protocol

Observations: Water temp: 22.58 C; Cond: 381 umhos; DO: 7.71 mg/L; pH: 7.47 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 14' / < 1'; Substrate: cobble, gravel, sand

Canopy: closed; Bank Stability: fair; Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

AMNET Site # AN0214   *Stream Name:* **Indian Grave Bk**

Location: **Hardscrabble Rd N of Old Army Rd; Bernardsville Boro; Somerset County**

Collection Date: *7/15/2008*   *USGS Topo Map:* **Bernardsville**

	Genus	*Tolerance Value*	*Amount*
*	Ceratopsyche	4	12
*	Hydropsyche	4	9
	Stenelmis	5	6
*	Acerpenna	4	4
	Dubiraphia	6	4
*	Glossosoma	0	4
	Rheotanytarsus	6	4
*	Acroneuria	0	3
	Polypedilum	6	3
	Promoresia	2	3
	Antocha	3	2
	Boyeria	2	2
*	Cheumatopsyche	5	2
*	Chimarra	4	2
	Eclipidrilus	8	2
*	Hydroptila	6	2
*	Lype	2	2
*	Mystacides	4	2
	Psephenus	4	2
	Stylodrilus	10	2
	Stylurus	4	2
	Tanytarsus	6	2
*	Baetidae	4	1
*	Caenis	7	1
	Corydalus	4	1
	Cura	4	1
	Hemerodromia	6	1
*	Heterocloeon	2	1
*	Leuctra	0	1
	Macronychus	2	1
	Musculium	5	1
	Optioservus	4	1
	Parametriocnemus	5	1
	Prosimulium	2	1
	Prostoma	7	1
*	Rhyacophila	1	1
	Simulium	6	1

* *(EPT organism)*   *Taxa Richness:*   37   *Population:*   91

Hilsenhoff Biotic Index (HBI):   4.14   *# Scrapers:*   8

% Sensitive EPT: 26.4%   *Attribute 2 genera:*   5

% Non-Insect Taxa: 13.5%   *Attribute 3 genera:*   9

HGMI Rating: **74.81**   **Excellent**

Habitat Analysis: 169   Optimal   USEPA Protocol

Observations: Water temp: 21.20 C; Cond: 222 umhos; DO: 8.07 mg/L; pH: 7.30 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 13' / < 1'; Substrate: cobble, gravel, sand, root mats

Canopy: partly open; Bank Stability: good;   Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: rural, forested

Other: fish, periphytes, filamentous algae

AMNET Site # **AN0215**   **Stream Name:** **Primrose Bk**

Location: **Jockey Hollow Rd; Harding Twp; Morris County**

Collection Date: **7/15/2008**   **USGS Topo Map:**   **Mendham**

	Genus	*Tolerance Value*	*Amount*
*	Leuctra	0	20
	Aulodrilus	8	15
*	Tallaperla	0	11
	Oulimnius	4	6
*	Diplectrona	0	3
	Lumbriculus	8	3
*	Maccaffertium	3	3
*	Cheumatopsyche	5	2
*	Dolophilodes	0	2
	Ectopria	5	2
*	Glossosoma	0	2
	Optioservus	4	2
	Parametriocnemus	5	2
*	Rhyacophila	1	2
	Thienemannimyia	6	2
	Tubifex	10	2
	Antocha	3	1
	Bezzia	6	1
	Chrysops	6	1
	Cricotopus	7	1
*	Eurylophella	4	1
	Hexatoma	2	1
	Lanthus	5	1
*	Lepidostoma	1	1
	Micropsectra	7	1
	Nais	8	1
	Paralauterborniella	8	1
*	Paraleptophlebia	1	1
	Paratanytarsus	6	1
*	Polycentropus	6	1
	Polypedilum	6	1
	Rheotanytarsus	6	1
	Saetheria	4	1
	Sialis	4	1
	Simulium	6	1
	Stempellinella	6	1
	Tvetenia	5	1

(EPT organism)   **Taxa Richness:** 37   **Population:**   100

Hilsenhoff Biotic Index (HBI):   3.56   **# Scrapers:**   5

% Sensitive EPT: 47.0%   **Attribute 2 genera:**   8

% Non-Insect Taxa: 10.8%   **Attribute 3 genera:**   6

HGMI Rating: **77.04**   **Excellent**

Habitat Analysis: 162   Optimal   USEPA Protocol

Observations: Water temp: 17.23 C; Cond: 116 umhos; DO: 8.47 mg/L; pH: 7.02 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 10' / < 1'; Substrate: cobble, gravel, sand

Canopy: mostly closed; Bank Stability: fair; Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: forested

Other: fish, frogs, salamander

AMNET Site # **AN0216**   **Stream Name:** **Primrose Bk**

Location: **Lees Hill Rd / Madisonville; Harding Twp; Morris County**

Collection Date: *7/29/2008*   **USGS Topo Map:** **Bernardsville**

	Genus	Tolerance Value	Amount
*	Hydropsyche	4	24
*	Maccaffertium	3	17
*	Chimarra	4	10
*	Cheumatopsyche	5	9
	Stenelmis	5	8
	Optioservus	4	6
	Lumbriculus	8	4
	Macronychus	2	3
	Psephenus	4	3
	Gammarus	6	2
*	Oecetis	8	2
	Polypedilum	6	2
	Rhagovelia	9	2
	Ancyronyx	2	1
*	Apatania	3	1
*	Baetis	6	1
	Microvelia	6	1
	Nigronia	2	1
	Oulimnius	4	1
	Rheocricotopus	6	1
	Tvetenia	5	1

(EPT organism)   *Taxa Richness:* 21   *Population:* 100

Hilsenhoff Biotic Index (HBI): 4.38   *# Scrapers:* 6

% Sensitive EPT: 31.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 9.5%   *Attribute 3 genera:* 6

HGMI Rating: **56.74**   **Good**

Habitat Analysis: 144   Suboptimal   USEPA Protocol

Observations: Water temp: 20.64 C; Cond: 258 umhos; DO: 6.90 mg/L; pH: 8.54 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 15' / < 1'; Substrate: cobble, gravel, root mats

Canopy: mostly closed; Bank Stability: fair;   Bank Vegetation: trees, shrubs, weeds, vines, lawn

Stream Gradient: High Gradient Stream;   Land Uses: rural, forested

Pipes / Ditches: storm sewers

Other: crayfish, clams, mussels, purple loosestrife

AMNET Site # **AN0217** **Stream Name:** **Great Bk**

Location: **Blackwells Place; Harding Twp; Morris County**

Collection Date: *7/15/2008* **USGS Topo Map:** **Mendham**

Genus	Tolerance Value	Amount
Parametriocnemus	5	15
* Dolophilodes	0	13
* Diplectrona	0	8
Lumbriculus	8	8
Micropsectra	7	8
* Acentrella	4	6
* Leuctra	0	4
* Glossosoma	0	3
Phaenopsectra	7	3
Polypedilum	6	3
Simulium	6	3
* Hydropsyche	4	2
Lumbricidae	10	2
* Nemouridae	2	2
Physella	9.1	2
Thienemannimyia	6	2
Diamesa	5	1
Dicranota	3	1
Ectopria	5	1
* Eurylophella	4	1
* Lepidostoma	1	1
Limnodrilus	10	1
Lymnaeidae	6	1
Microvelia	6	1
* Molanna	6	1
Nais	8	1
Oulimnius	4	1
Paratanytarsus	6	1
Planariidae	4	1
Prodiamesa	3	1
Pseudolimnophila	2	1
Tipula	4	1

(EPT organism) **Taxa Richness:** 32 **Population:** 100

Hilsenhoff Biotic Index (HBI): 4.15 **# Scrapers:** 8

% Sensitive EPT: 39.0% **Attribute 2 genera:** 8

% Non-Insect Taxa: 21.9% **Attribute 3 genera:** 5

HGMI Rating: **71.13** **Excellent**

Habitat Analysis: 128 Suboptimal USEPA Protocol

Observations: Water temp: 17.58 C; Cond: 325 umhos; DO: 8.48 mg/L; pH: 7.27 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 5' / < 1'; Substrate: cobble, gravel, root mats

Canopy: mostly closed; Bank Stability: fair; Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream; Land Uses: suburban

Pipes / Ditches: storm sewers

Other: fish, salamander

	Genus	Tolerance Value	Amount
	Gammarus	6	22
	Polypedilum	6	12
	Musculium	5	11
	Paratanytarsus	6	11
	Tanytarsus	6	7
	Cura	4	4
	Enallagma	9	3
	Limnodrilus	10	3
	Pisidium	6.8	3
	Stenelmis	5	3
	Ancyronyx	2	2
*	Cheumatopsyche	5	2
	Hetaerina	6	2
	Physella	9.1	2
	Prostoma	7	2
	Aeshna	5	1
*	Baetis	6	1
	Cryptochironomus	8	1
	Dugesia	4	1
	Endochironomus	10	1
	Gyraulus	6	1
	Helisoma	7	1
*	Hydropsyche	4	1
	Hymanella	4	1
	Nais	8	1
	Tubifex	10	1

(EPT organism)   *Taxa Richness:* 26   *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.06   *# Scrapers:* 4

% Sensitive EPT: 1.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 50.0%   *Attribute 3 genera:* 1

HGMI Rating: **25.52**   **Fair**

Habitat Analysis: 107   Marginal   USEPA Protocol

Observations: Water temp: 21.02 C; Cond: 603 umhos; DO: 6.00 mg/L; pH: 7.38 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 10' / < 1'; Substrate: cobble, sand, silt, snags, root mats

Canopy: closed; Bank Stability: poor; Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream; Land Uses: commercial, forested

Other: fish, frogs, crayfish, periphytes; trash

Genus	*Tolerance Value*	*Amount*
Gammarus	6	60
Physella	9.1	13
Valvata	2	12
Musculium	5	3
Cricotopus	7	2
Dubiraphia	6	2
Tanytarsus	6	2
Tubifex	10	2
* Polycentropodidae	6	1
Stenelmis	5	1

* (EPT organism)   *Taxa Richness:*   10   *Population:*   100

Hilsenhoff Biotic Index (HBI):   5.98   *# Scrapers:*   4

% Sensitive EPT: 1.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 50.0%   *Attribute 3 genera:*   0

HGMI Rating: **17.44**   **Poor**

Habitat Analysis: 169   Optimal   USEPA Protocol

Observations: Water temp: 23.01 C; Cond: 479 umhos; DO: 9.05 mg/L; pH: 7.13 SU

Clarity: turbid, brown; Flow Rate: moderate;   Width/Depth: 18' / 1-2'; Substrate: cobble, gravel, sand, root mats

Canopy: partly open; Bank Stability: good;   Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: forested ("Great Swamp")

Other: crayfish, snails, macrophytes, periphytes

AMNET Site # **AN0220**   **Stream Name:** **Loantaka Bk**

Location: **Bluestone Terrace; Morristown; Morris County**

Collection Date: *7/15/2008*   **USGS Topo Map:** **Morristown**

	Genus	Tolerance Value	Amount
	Gammarus	6	42
	Dugesia	4	18
	Sphaeriidae	8	11
*	Hydropsyche	4	7
	Paratanytarsus	6	7
	Menetus	6	6
	Stenelmis	5	3
*	Cheumatopsyche	5	2
	Crangonyx	8	1
	Limnodrilus	10	1
	Micropsectra	7	1
	Polypedilum	6	1

(EPT organism)   *Taxa Richness:* 12   *Population:*   100

Hilsenhoff Biotic Index (HBI):   5.74   *# Scrapers:*   2

% Sensitive EPT: 0.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 50.0%   *Attribute 3 genera:*   0

HGMI Rating: **15.71**   **Poor**

Habitat Analysis: 145   Suboptimal   USEPA Protocol

Observations: Water temp: 21.66 C; Cond: 1203 umhos; DO: 6.52 mg/L; pH: 7.09 SU

   Clarity: clear; Flow Rate: moderate;   Width/Depth: 10' /< 1';   Substrate: cobble, gravel, root mats

   Canopy: mostly closed; Bank Stability: fair;   Bank Vegetation: trees, shrubs, grasses, weeds

   Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested (park includes horse trails)

   Pipes / Ditches: storm sewers

   Other: fish, macrophytes, periphytes; horse back riding

AMNET Site #   **AN0221**   *Stream Name:*   **Loantaka Bk**

Location: **Green Village Rd; Harding Twp; Morris County**

Collection Date: *7/29/2008*   *USGS Topo Map:*   **Chatham**

	Genus	Tolerance Value	Amount
	Gammarus	6	35
	Musculium	5	35
	Phaenopsectra	7	4
	Physella	9.1	4
	Stenelmis	5	4
	Pisidium	6.8	3
	Caecidotea	8	2
	Gyraulus	6	2
	Optioservus	4	2
	Antocha	3	1
	Cryptochironomus	8	1
	Hemerodromia	6	1
*	Hydropsyche	4	1
	Polypedilum	6	1
	Rhagovelia	9	1
	Stenochironomus	5	1
	Stylodrilus	10	1
	Tanytarsus	6	1

* (EPT organism)   *Taxa Richness:*   18   *Population:*   100

Hilsenhoff Biotic Index (HBI):   5.83   *# Scrapers:*   4

% Sensitive EPT: 0.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 38.9%   *Attribute 3 genera:*   1

HGMI Rating: **25.32**   **Fair**

Habitat Analysis: 114   Suboptimal   USEPA Protocol

Observations: Water temp: 21.86 C; Cond: 963 umhos; DO: 7.74 mg/L; pH: 7.58 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 27' / < 1';   Substrate: gravel, sand, root mats

Canopy: mostly closed; Bank Stability: poor;   Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Other: fish, crayfish, macrophytes

Genus	Tolerance Value	Amount
Limnodrilus	10	20
Thienemannimyia	6	14
Pisidium	6.8	13
Glyptotendipes	10	11
Musculium	5	6
Polypedilum	6	6
Tanytarsus	6	5
Nais	8	4
Physella	9.1	4
Xenochironomus	0	4
Helobdella	8	3
* Cheumatopsyche	5	2
Dicrotendipes	8	2
Tubifex	10	2
Dero	10	1
Ferrissia	7	1
Haemonais	8	1
Phaenopsectra	7	1

* (EPT organism)   *Taxa Richness:* 18   *Population:* 100

Hilsenhoff Biotic Index (HBI): 7.49   *# Scrapers:* 3

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 1

% Non-Insect Taxa: 55.6%   *Attribute 3 genera:* 0

HGMI Rating: **18.70**   **Poor**

Habitat Analysis: 128   Suboptimal   USEPA Protocol

Observations: Water temp: 22.86 C; Cond: 536 umhos; DO: 3.83 mg/L; pH: 6.87 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 9' / < 1'; Substrate: cobble, gravel, sand

Canopy: closed; Bank Stability: fair;   Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, golf course

Pipes / Ditches: storm sewers

Other: adj to Fairmont Country Club golf course

Genus	Tolerance Value	Amount
Dero	10	33
Chironomus	10	18
Caecidotea	8	15
Limnodrilus	10	10
Hydroporus	5	7
Tubifex	10	3
Nais	8	2
Orthocladiinae	5	2
Physella	9.1	2
Sphaeriidae	8	2
Crangonyx	8	1
Nematoda	6	1
Orconectes	6	1
Peltodytes	5	1
* Phryganeidae	4	1
Tanytarsus	6	1

(EPT organism)   *Taxa Richness:* 16   *Population:* 100

Hilsenhoff Biotic Index (HBI): 8.90   *# Scrapers:* 1

% Sensitive EPT: 1.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 62.5%   *Attribute 3 genera:* 1

HGMI Rating: **9.99** **Poor**

Habitat Analysis: 134   Suboptimal   USEPA Protocol

Observations: Water temp: 22.30 C; Cond: 364 umhos; DO: 0.59 mg/L; pH: 6.28 SU

Clarity: turbid; cedar brown; Flow Rate: moderate; Width/Depth: 23' / 3'; Substrate: cobble, sand, silt, snags

Canopy: mostly open; Bank Stability: fair; Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream; Land Uses: rural

Other: frogs, crayfish, macrophytes, waterfowl, purple loosestrife; gage: 2.8

	Genus	*Tolerance Value*	*Amount*
	Gammarus	6	47
	Stenelmis	5	19
	Limnodrilus	10	15
	Microtendipes	7	5
	Ancylidae	6	4
	Amnicola	4.8	2
	Polypedilum	6	2
	Argia	6	1
*	Cheumatopsyche	5	1
	Corbicula	4	1
	Cricotopus	7	1
	Rheotanytarsus	6	1
	Sphaeriidae	8	1

* (EPT organism)   *Taxa Richness:*   13   *Population:*   100

Hilsenhoff Biotic Index (HBI):   6.44   *# Scrapers:*   3

% Sensitive EPT: 0.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 46.2%   *Attribute 3 genera:*   0

HGMI Rating: **17.81**   **Poor**

Habitat Analysis: 147   Suboptimal   USEPA Protocol

Observations: Water temp: 23.64 C; Cond: 464 umhos; DO: 7.20 mg/L; pH: 7.20 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 53' / < 1'; Substrate: cobble, gravel, sand

Canopy: mostly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Other: fish, frogs, crayfish, periphytes, filamentous algae

AMNET Site # AN0225   *Stream Name:* **UNT to Dead River**

Location: **off Somerville Rd; Bernards Twp; Somerset County**

Collection Date: *8/14/2008*   *USGS Topo Map:* **Bernardsville**

	Genus	Tolerance Value	Amount
	Polypedilum	6	13
	Stenelmis	5	12
	Gammarus	6	10
	Dugesia	4	6
*	Hydropsyche	4	5
*	Baetis	6	4
	Boyeria	2	4
	Micropsectra	7	4
	Pisidium	6.8	4
	Stictochironomus	9	4
	Antocha	3	3
	Limnodrilus	10	3
	Microtendipes	7	3
	Psephenus	4	3
	Thienemannimyia	6	3
	Coenagrionidae	9	2
*	Mystacides	4	2
	Tanytarsus	6	2
	Aulodrilus	8	1
	Brillia	5	1
*	Cheumatopsyche	5	1
*	Chimarra	4	1
	Cladotanytarsus	7	1
	Hydrophilidae	5	1
	Lanthus	5	1
	Macronychus	2	1
	Phaenopsectra	7	1
	Rhagovelia	9	1
	Slavina	7	1
	Stempellinella	6	1
	Trepobates	8	1

* (EPT organism)   *Taxa Richness:*   31   *Population:*   100

Hilsenhoff Biotic Index (HBI):   5.71   *# Scrapers:*   4

% Sensitive EPT: 7.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 19.4%   *Attribute 3 genera:*   6

HGMI Rating: **44.86**   **Good**

Habitat Analysis: 143   Suboptimal   USEPA Protocol

Observations: Water temp: 18.35 C;   Cond: 484 umhos;   DO: 9.77 mg/L; pH: 7.52 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 5' / < 1';   Substrate: cobble, gravel, sand, snags

Canopy: mostly closed; Bank Stability: fair;   Bank Vegetation: trees, weeds, vines

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Other: fish, frogs, crayfish

AMNET Site # **AN0226**   **Stream Name:** **Dead River**

Location: **off Somerville Rd Opp Shannon Hill Rd; Bernards Twp; Somerset County**

Collection Date: *8/14/2008*   **USGS Topo Map:** **Bernardsville**

Genus	Tolerance Value	Amount
* Hydropsyche	4	21
* Baetis	6	12
Stenelmis	5	11
Gammarus	6	9
Psephenus	4	7
* Cheumatopsyche	5	6
Optioservus	4	6
* Chimarra	4	5
* Ceratopsyche	4	4
* Hydropsychidae	4	3
Antocha	3	2
* Apatania	3	2
* Hydroptila	6	2
Polypedilum	6	2
Cladotanytarsus	7	1
Dugesia	4	1
Ectopria	5	1
Hemerodromia	6	1
Micropsectra	7	1
Microtendipes	7	1
Nigronia	2	1
* Stenacron	4	1

(EPT organism)   **Taxa Richness:** 22   *Population:* 100

Hilsenhoff Biotic Index (HBI): 4.73   *# Scrapers:* 6

% Sensitive EPT: 22.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 9.1%   *Attribute 3 genera:* 3

HGMI Rating: **49.05** **Good**

Habitat Analysis: 160   Optimal   USEPA Protocol

Observations: Water temp: 18.29 C; Cond: 488 umhos; DO: 11.12 mg/L; pH: 7.77 SU

Clarity: clear; Flow Rate: slow; Width/Depth: 9' / < 1'; Substrate: cobble, gravel, sand

Canopy: mostly open; Bank Stability: good; Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Other: fish, frogs, crayfish, periphytes, filamentous algae

Genus	Tolerance Value	Amount
Trichocorixa	9	85
Gammarus	6	4
Menetus	6	4
Limnodrilus	10	2
Physella	9.1	2
Polypedilum	6	2
Chironomus	10	1

* (EPT organism)   *Taxa Richness:*   7   *Population:*   100

Hilsenhoff Biotic Index (HBI):   8.73   *# Scrapers:*   2

% Sensitive EPT: 0.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 57.1%   *Attribute 3 genera:*   0

HGMI Rating: **5.15**   **Poor**

Habitat Analysis: 103   Marginal   USEPA Protocol

Observations: Water temp: 22.76 C; Cond: 472 umhos; DO: 6.18 mg/L; pH: 6.92 SU

Clarity: turbid, greenish-brown; Flow Rate: slow; Width/Depth: 38' / 2 - 3'; Substrate: mud, silt, snags

Canopy: mostly open; Bank Stability: poor; Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: commercial, forested

Other: fish, frogs, crayfish, macrophytes

AMNET Site # **AN0227A**   *Stream Name:* **Harrison Bk**

Location: **off Valley Rd; Bernards Twp; Somerset County**

Collection Date: *8/14/2008*   *USGS Topo Map:* **Bernardsville**

Genus	Tolerance Value	Amount
Gammarus	6	65
Stenelmis	5	5
Caecidotea	8	4
Stictochironomus	9	4
Dubiraphia	6	3
Ischnura	9	3
Limnodrilus	10	3
Cladotanytarsus	7	2
Physella	9.1	2
Ancyronyx	2	1
Branchiura	10	1
* Caenis	7	1
Corixidae	9	1
Microtendipes	7	1
Musculium	5	1
Polypedilum	6	1
Rhagovelia	9	1
Rheotanytarsus	6	1

* (EPT organism)   *Taxa Richness:* 18   *Population:* 100

Hilsenhoff Biotic Index (HBI):   6.51   *# Scrapers:* 3

% Sensitive EPT: 1.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 33.3%   *Attribute 3 genera:* 1

HGMI Rating: **23.52**   **Fair**

Habitat Analysis: 125   Suboptimal   USEPA Protocol

Observations: Water temp: 19.36 C; Cond: 444 umhos; DO: 7.44 mg/L; pH: 7.37 SU

Clarity: turbid, grey-brown; Flow Rate: slow;   Width/Depth: 15' / < 1';   Substrate: gravel, sand, silt, snags, root mats, undercut banks

Canopy: mostly closed; Bank Stability: poor;   Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers (6" PVC pipe)

Other: fish, crayfish; adj to ball field

AMNET Site # **AN0228**   **Stream Name:** **Passaic River**

Location: **S Main Ave Myers Rd; Passaic Twp; Morris & Somerset County**

Collection Date: *8/5/2008*   **USGS Topo Map:** **Chatham**

	Genus	Tolerance Value	Amount
	Limnodrilus	10	41
	Dubiraphia	6	12
	Polypedilum	6	11
	Gammarus	6	6
	Paralauterborniella	8	5
	Trichocorixa	9	3
	Tubifex	10	3
	Amnicola	4.8	2
	Caecidotea	8	2
	Sialis	4	2
	Chironomus	10	1
	Clinotanypus	8	1
	Conchapelopia	6	1
	Corbicula	4	1
	Cryptochironomus	8	1
	Cura	4	1
	Gloiobdella	6	1
*	Polycentropus	6	1
	Prostoma	7	1
	Rheotanytarsus	6	1
*	Stenacron	4	1
	Stenochironomus	5	1

(EPT organism)   **Taxa Richness:** 22   *Population:*   99

Hilsenhoff Biotic Index (HBI):   7.97   *# Scrapers:*   3

% Sensitive EPT: 2.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 40.9%   *Attribute 3 genera:*   0

HGMI Rating: **19.25**   **Poor**

Habitat Analysis: 87   Marginal   USEPA Protocol

Observations: Water temp: 23.00 C; Cond: 479 umhos; DO: 4.92 mg/L; pH: 7.00 SU

Clarity: turbid; Flow Rate: slow; Width/Depth: 35' / 2 - 3'; Substrate: gravel, sand, mud

Canopy: partly open; Bank Stability: poor;   Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: forested

Other: crayfish

Genus	Tolerance Value	Amount
Limnodrilus	10	38
Gammarus	6	19
Pisidium	6.8	8
Corbicula	4	7
Dicrotendipes	8	4
Stenelmis	5	4
Cryptochironomus	8	3
Helisoma	7	3
* Stenacron	4	3
Helobdella	8	2
Microtendipes	7	2
* Cheumatopsyche	5	1
Ferrissia	7	1
Phaenopsectra	7	1
Polypedilum	6	1
Tanytarsus	6	1
Thienemannimyia	6	1
Tubifex	10	1

(EPT organism)   *Taxa Richness:* 18   *Population:*   100

Hilsenhoff Biotic Index (HBI):   7.62   *# Scrapers:*   5

% Sensitive EPT: 3.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 44.4%   *Attribute 3 genera:*   0

HGMI Rating: **20.47**   **Poor**

Habitat Analysis: 124   Suboptimal   USEPA Protocol

Observations: Water temp: 23.14 C; Cond: 524 umhos;   DO: 5.17 mg/L; pH: 7.12 SU

Clarity: turbid, brown; Flow Rate: moderate;   Width/Depth: 86' / 2'; Substrate: cobble, gravel, sand

Canopy: partly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: forested (Stanley / Passaic River Park)

Pipes / Ditches: storm sewers

Other: fish, crayfish; sampled upstream of weir

AMNET Site # **AN0230**   *Stream Name:* **Passaic River**

Location: **Summit Ave Chatham Rd; Chatham Twp; Morris & Union County**

Collection Date: *8/5/2008*   *USGS Topo Map:* **Chatham**

	Genus	*Tolerance Value*	*Amount*
	Limnodrilus	10	29
	Stenelmis	5	16
	Microtendipes	7	9
	Gammarus	6	8
	Polypedilum	6	7
	Cura	4	5
	Laevapex	6	4
	Prostoma	7	4
*	Cheumatopsyche	5	3
	Corbicula	4	3
	Musculium	5	2
	Caecidotea	8	1
*	Ceratopsyche	4	1
	Erpobdellidae	8	1
*	Hydropsyche	4	1
	Nais	8	1
	Rheotanytarsus	6	1
*	Stenacron	4	1
	Tanytarsus	6	1

* (EPT organism)   *Taxa Richness:* 19   *Population:*   98

Hilsenhoff Biotic Index (HBI):   6.94   *# Scrapers:*   3

% Sensitive EPT: 1.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 52.6%   *Attribute 3 genera:*   0

HGMI Rating: **17.93**   **Poor**

Habitat Analysis: 117   Suboptimal   USEPA Protocol

Observations: Water temp: 23.51 C; Cond: 504 umhos; DO: 8.09 mg/L; pH: 7.44 SU

Clarity: slightly turbid; Flow Rate: moderate;   Width/Depth: 42' / < 1 - 1.0'; Substrate: cobble, gravel, sand

Canopy: partly open; Bank Stability: fair;   Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: commercial, suburban

Pipes / Ditches: storm sewers

Other: fish, crayfish, periphytes

Genus	Tolerance Value	Amount
Musculium	5	28
Trichocorixa	9	14
Polypedilum	6	11
Tanytarsus	6	10
Chironomus	10	9
Dicrotendipes	8	7
Gammarus	6	4
Limnodrilus	10	4
Rheotanytarsus	6	3
Nais	8	2
Prostoma	7	2
Caecidotea	8	1
Helisoma	7	1
Helobdella	8	1
Paratanytarsus	6	1
Physella	9.1	1
Planariidae	4	1

* (EPT organism)   *Taxa Richness:* 17   *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.92   *# Scrapers:* 2

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 58.8%   *Attribute 3 genera:* 0

HGMI Rating: **15.20** **Poor**

Habitat Analysis: 99   Marginal   USEPA Protocol

Observations: Water temp: 25.44 C;   Cond: 580 umhos;   DO: 7.81 mg/L; pH: 7.20 SU

Clarity: turbid, brown; Flow Rate: slow;   Width/Depth: >100' / 1 - 3 ';   Substrate: cobble, sand, mud, snags

Canopy: open; Bank Stability: fair;   Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers (flowing)

Other: fish, crayfish, clams, waterfowl; trash

AMNET Site # **AN0231A**   **Stream Name:** **Passaic River**

Location: **Passaic Ave; Chatham Twp; Morris & Essex County**

Collection Date: *8/14/2008*   **USGS Topo Map:** **Caldwell**

Genus	Tolerance Value	Amount
Limnodrilus	10	16
Musculium	5	15
Polypedilum	6	14
Tanytarsus	6	14
Gammarus	6	7
Paralauterborniella	8	5
Rheotanytarsus	6	4
Tubifex	10	4
Dicrotendipes	8	3
Procladius	9	3
Cura	4	2
Gloiobdella	6	2
Spirosperma	10	2
Ablabesmyia	8	1
Corbicula	4	1
Glyptotendipes	10	1
Nematoda	6	1
Stictochironomus	9	1
Stylodrilus	10	1
Tipulidae	3	1
Tribelos	5	1
Trichocorixa	9	1

(EPT organism)   **Taxa Richness:** 22   *Population:*   100

Hilsenhoff Biotic Index (HBI):   7.04   *# Scrapers:*   0

% Sensitive EPT: 0.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 45.5%   *Attribute 3 genera:*   0

HGMI Rating: **20.37**   **Poor**

Habitat Analysis: 98   Marginal   USEPA Protocol

Observations: Water temp: 21.12 C; Cond: 589 umhos; DO: 9.25 mg/L; pH: 7.49 SU

Clarity: turbid, brown; Flow Rate: slow;   Width/Depth: 88' / 2 - 3'; Substrate: sand, mud, silt, snags

Canopy: partly open; Bank Stability: fair;   Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Other: fish, frogs, turtle; trash

AMNET Site # AN0231D   **Stream Name: Canoe Bk**

Location: Parsonage Hill Rd; Millburn Twp; Essex County

Collection Date: 8/14/2008   USGS Topo Map: Roselle

	Genus	Tolerance Value	Amount
	Gammarus	6	29
	Musculium	5	14
*	Stenacron	4	12
	Rhagovelia	9	10
	Dugesia	4	8
	Stenelmis	5	8
*	Hydropsyche	4	5
*	Cheumatopsyche	5	4
	Antocha	3	2
	Microvelia	6	2
	Cricotopus	7	1
	Laevapex	6	1
	Microtendipes	7	1
	Orconectes	6	1
	Polypedilum	6	1
	Rheotanytarsus	6	1

(EPT organism)   *Taxa Richness:* 16   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.50   *# Scrapers:* 3

% Sensitive EPT: 12.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 31.3%   *Attribute 3 genera:* 2

HGMI Rating: **30.90**   **Fair**

Habitat Analysis: 138   Suboptimal   USEPA Protocol

Observations: Water temp: 19.94 C; Cond: 451 umhos; DO: 7.68 mg/L; pH: 7.11 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 44' / < 1'; Substrate: cobble, gravel, sand, silt

Canopy: partly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: commercial, forested

Pipes / Ditches: storm sewers

Other: fish, frogs, crayfish, periphytes, waterfowl; adj to East Orange Water Commission

AMNET Site # **AN0231E**   **Stream Name:** **Canoe Bk**

Location: **E. McClellan St; Livingston Twp; Essex County**

Collection Date: *9/8/2008*   **USGS Topo Map:** **Caldwell**

	Genus	Tolerance Value	Amount
*	Hydropsyche	4	25
	Stenelmis	5	16
*	Cheumatopsyche	5	6
	Eclipidrilus	8	2
	Caecidotea	8	1
	Calopteryx	6	1
	Cardiocladius	5	1
	Enallagma	9	1
	Gerridae	8	1
	Hetaerina	6	1
	Polypedilum	6	1
	Rheotanytarsus	6	1
	Tanytarsus	6	1

(EPT organism)   *Taxa Richness:* 13   *Population:*   58

Hilsenhoff Biotic Index (HBI):   4.93   *# Scrapers:*   1

% Sensitive EPT: 0.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 15.4%   *Attribute 3 genera:*   0

HGMI Rating: **26.13**   **Fair**

Habitat Analysis: 149   Suboptimal   USEPA Protocol

Observations: Water temp: 18.77 C; Cond: 432 umhos; DO: 8.50 mg/L; pH: 7.36 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 18' / < 1 - 1'; Substrate: cobble, gravel, sand, root mats, undercut banks

Canopy: closed; Bank Stability: poor;   Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Pipes / Ditches: storm sewers

Other: fish, macrophytes

	Genus	Tolerance Value	Amount
	Tanytarsus	6	51
	Stylodrilus	10	11
*	Cheumatopsyche	5	6
*	Chimarra	4	5
*	Glossosoma	0	5
	Dicranota	3	4
*	Acroneuria	0	2
	Lumbricina	6	2
	Cardiocladius	5	1
	Ceratopogonidae	6	1
*	Ceratopsyche	4	1
	Corydalus	4	1
	Cura	4	1
*	Leuctra	0	1
	Parametriocnemus	5	1
	Paratanytarsus	6	1
	Phaenopsectra	7	1
*	Plauditus	4	1
	Psephenus	4	1
*	Pteronarcys	0	1
	Rhagovelia	9	1
	Tipula	4	1

(EPT organism)   *Taxa Richness:* 22   *Population:*   100

Hilsenhoff Biotic Index (HBI):	5.52	*# Scrapers:* 4
% Sensitive EPT:	15.0%	*Attribute 2 genera:* 3
% Non-Insect Taxa:	13.6%	*Attribute 3 genera:* 5

HGMI Rating: **49.25**   **Good**

Habitat Analysis: 145   Suboptimal   USEPA Protocol

Observations: Water temp: 17.86 C; Cond: 502 umhos; DO: 8.82 mg/L; pH: 7.63 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 10' / < 1'; Substrate: cobble, gravel, sand

Canopy: mostly closed; Bank Stability: fair;   Bank Vegetation: trees, shrubs, grasses

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Other: fish, crayfish, salamander

AMNET Site # **AN0233**   *Stream Name:* **Whippany River**

Location: **Whitehead Rd; Morris Twp; Morris County**

Collection Date: *9/3/2008*   *USGS Topo Map:* **Mendham**

	Genus	*Tolerance Value*	*Amount*
	Gammarus	6	26
	Macronychus	2	13
	Cladotanytarsus	7	7
	Calopteryx	6	5
	Micropsectra	7	4
	Rhagovelia	9	4
	Rheotanytarsus	6	4
	Gomphus	5	3
*	Lype	2	3
*	Maccaffertium	3	3
	Microtendipes	7	3
	Ancyronyx	2	2
*	Centroptilum	2	2
*	Cheumatopsyche	5	2
	Ophiogomphus	1	2
	Optioservus	4	2
	Paratanytarsus	6	2
	Polypedilum	6	2
	Stenelmis	5	2
*	Baetis	6	1
	Boyeria	2	1
	Chrysops	6	1
*	Hydatophylax	2	1
	Lumbriculus	8	1
	Orconectes	6	1
	Thienemanniella	6	1
	Trepobates	8	1
	Tubificidae	10	1

* (EPT organism)   *Taxa Richness:* 28   *Population:*   100

Hilsenhoff Biotic Index (HBI):   5.16   *# Scrapers:*   3

% Sensitive EPT: 10.0%   *Attribute 2 genera:*   1

% Non-Insect Taxa: 14.3%   *Attribute 3 genera:*   7

HGMI Rating: **52.05**   **Good**

Habitat Analysis: 128   Suboptimal   USEPA Protocol

Observations: Water temp: 18.94 C; Cond: 331 umhos; DO: 8.38 mg/L; pH: 7.41 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 12' / < 1'; Substrate: cobble, sand, silt, snags

Canopy: mostly closed; Bank Stability: fair; Bank Vegetation: trees, shrubs, weeds, vines

Stream Gradient: High Gradient Stream;   Land Uses: forested

Other: fish, crayfish; exposed clay banks; "Trout Stocked Waters"

AMNET Site # **AN0234**   **Stream Name:** **Whippany River**

Location: **Ridgedale Ave; Morristown; Morris County**

Collection Date: *9/3/2008*   **USGS Topo Map:** **Morristown**

	Genus	Tolerance Value	Amount
*	Baetis	6	14
*	Cheumatopsyche	5	12
*	Hydropsyche	4	10
	Rheotanytarsus	6	9
	Cardiocladius	5	8
*	Chimarra	4	8
	Stenelmis	5	7
	Gammarus	6	6
	Dugesia	4	5
	Cricotopus	7	4
	Nais	8	3
	Prostoma	7	3
	Simulium	6	2
	Tanytarsus	6	2
	Ancyronyx	2	1
	Antocha	3	1
*	Hydroptila	6	1
	Macronychus	2	1
	Microtendipes	7	1
	Nematoda	6	1
*	Stenacron	4	1

* (EPT organism)   *Taxa Richness:* 21   *Population:*   100

Hilsenhoff Biotic Index (HBI):   5.28   *# Scrapers:*   4

% Sensitive EPT: 24.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 23.8%   *Attribute 3 genera:*   1

HGMI Rating: **38.48**   **Fair**

Habitat Analysis: 129   Suboptimal   USEPA Protocol

Observations: Water temp: 21.54 C; Cond: 593 umhos; DO: 6.56 mg/L; pH: 7.38 SU

> Clarity: clear; Flow Rate: moderate;   Width/Depth: 20' / 2'; Substrate: cobble, gravel, sand

> Canopy: mostly open; Bank Stability: fair;   Bank Vegetation: trees, weeds

> Stream Gradient: High Gradient Stream;   Land Uses: commercial

> Pipes / Ditches: storm sewers

> Other: fish, crayfish, purple loosestrife; trash, orange floc, oil sheen

AMNET Site # **AN0234A**   *Stream Name:* **Watnong Bk**

Location: **Lake Rd; Morristown; Morris County**

Collection Date: *9/3/2008*   *USGS Topo Map:* **Morristown**

Genus	Tolerance Value	Amount
* Cheumatopsyche	5	34
* Hydropsyche	4	25
* Ceratopsyche	4	8
* Baetis	6	7
* Glossosoma	0	4
Stenelmis	5	4
* Chimarra	4	2
Dugesia	4	2
Micropsectra	7	2
Polypedilum	6	2
Rhagovelia	9	2
Brillia	5	1
Cladotanytarsus	7	1
Hydrolimax	4	1
* Hydroptilidae	4	1
Limnodrilus	10	1
Simulium	6	1
Tipula	4	1
Tribelos	5	1

* (EPT organism)   *Taxa Richness:* 19   *Population:* 100

Hilsenhoff Biotic Index (HBI):   4.69   *# Scrapers:*   2

% Sensitive EPT: 14.0%   *Attribute 2 genera:*   1

% Non-Insect Taxa: 15.8%   *Attribute 3 genera:*   3

HGMI Rating: **41.32**   **Fair**

Habitat Analysis: 140   Suboptimal   USEPA Protocol

Observations: Water temp: 19.72 C; Cond: 632 umhos; DO: 7.99 mg/L; pH: 7.40 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 17' / <1'; Substrate: cobble, gravel, sand, silt

Canopy: mostly closed; Bank Stability: good;   Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers

Other: fish; adj to Butterworth STP

AMNET Site # AN0235   *Stream Name:* **Whippany River**

Location: **Jefferson Rd; Hanover Twp; Morris County**

Collection Date: *8/19/2008*   *USGS Topo Map:* **Morristown**

	Genus	Tolerance Value	Amount
	Gammarus	6	39
	Polypedilum	6	10
	Tanytarsus	6	9
	Helisoma	7	7
	Phaenopsectra	7	6
	Microtendipes	7	5
*	Cheumatopsyche	5	4
	Rhagovelia	9	3
	Macronychus	2	2
	Stenelmis	5	2
	Ancyronyx	2	1
	Caecidotea	8	1
	Cricotopus	7	1
	Cura	4	1
	Dicrotendipes	8	1
	Dugesia	4	1
	Enallagma	9	1
	Fossaria	6	1
	Nais	8	1
	Paratanytarsus	6	1
	Paratendipes	8	1
	Pisidium	6.8	1
	Prostoma	7	1

* (EPT organism)   *Taxa Richness:*   23   *Population:*   100

Hilsenhoff Biotic Index (HBI):   6.19   *# Scrapers:*   5

% Sensitive EPT: 0.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 39.1%   *Attribute 3 genera:*   1

HGMI Rating: **29.02**   **Fair**

Habitat Analysis: 135   Suboptimal   USEPA Protocol

Observations: Water temp: 23.96 C; Cond: 679 umhos; DO: 12.78 mg/L; pH: 8.53 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 52' / 1 - 2'; Substrate: boulder, cobble, gravel, sand, root mats

Canopy: mostly closed; Bank Stability: fair;   Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers

Other: fish, crayfish, waterfowl, periphytes

Genus	Tolerance Value	Amount
Gammarus	6	49
Dugesia	4	32
Crangonyx	8	10
Pisidium	6.8	5
Caecidotea	8	4

* (EPT organism)	*Taxa Richness:* 5	*Population:*	100
Hilsenhoff Biotic Index (HBI): 5.68		*# Scrapers:*	0
% Sensitive EPT: 0.0%		*Attribute 2 genera:*	0
% Non-Insect Taxa: 100.0%		*Attribute 3 genera:*	0

HGMI Rating: **7.67**   **Poor**

Habitat Analysis: 130   Suboptimal   USEPA Protocol

Observations: Water temp: 17.51 C; Cond: 386 umhos; DO: 7.12 mg/L; pH: 6.51 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 6' / < 1'; Substrate: cobble, silt, snags, root mats

Canopy: closed; Bank Stability: fair;   Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Downstream of Impoundment: Mountain Lake

Other: fish; orange metal floc

AMNET Site # **AN0237**   **Stream Name:** **Troy Bk**

Location: **Beverwyck Rd; Parsippany-Troy Hills Twp; Morris County**

Collection Date: *8/19/2008*   **USGS Topo Map:** **Morristown**

	Genus	Tolerance Value	Amount
	Gammarus	6	28
*	Ceratopsyche	4	17
*	Hydropsyche	4	15
*	Baetis	6	12
*	Cheumatopsyche	5	6
	Stenelmis	5	5
	Cardiocladius	5	4
	Dugesia	4	3
	Caecidotea	8	2
	Crangonyx	8	2
	Polypedilum	6	2
	Ancyronyx	2	1
	Antocha	3	1
	Dubiraphia	6	1
*	Leucotrichia	3	1

(EPT organism)   **Taxa Richness:** 15   **Population:**   100

Hilsenhoff Biotic Index (HBI):   5.13   **# Scrapers:**   3

% Sensitive EPT: 13.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 26.7%   *Attribute 3 genera:*   1

HGMI Rating: **31.20**   **Fair**

Habitat Analysis: 147   Suboptimal   USEPA Protocol

Observations: Water temp: 19.88 C;   Cond: 672 umhos;   DO: 10.11 mg/L; pH: 8.06 SU

Clarity: slightly turbid, dark brown; Flow Rate: moderate;   Width/Depth: 21' / < 1'; Substrate: boulder, cobble, gravel, sand, snags, root mats

Canopy: mostly closed; Bank Stability: fair; Bank Vegetation: trees, shrubs, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers

Other: fish, crayfish, clams / mussels, periphytes, purple loosestrife

Genus	Tolerance Value	Amount
* Acentrella	4	21
* Cheumatopsyche	5	17
Gammarus	6	16
Polypedilum	6	14
Rheotanytarsus	6	10
Corbicula	4	4
Cricotopus	7	4
Rheocricotopus	6	3
Tanytarsus	6	3
Limnodrilus	10	2
Ancylidae	6	1
Cryptochironomus	8	1
Nais	8	1
Orconectes	6	1
Paratanytarsus	6	1
Saetheria	4	1

(EPT organism)   *Taxa Richness:* 16   *Population:*   100

Hilsenhoff Biotic Index (HBI):	5.47	*# Scrapers:*	1
% Sensitive EPT:	21.0%	*Attribute 2 genera:*	1
% Non-Insect Taxa:	37.5%	*Attribute 3 genera:*	0

HGMI Rating: **29.85**   **Fair**

Habitat Analysis: 126   Suboptimal   USEPA Protocol

Observations: Water temp: 22.40 C; Cond: 726 umhos; DO: 9.25 mg/L; pH: 7.50 SU

Clarity: clear; Flow Rate: fast;   Width/Depth: 45' / < 1'; Substrate: gravel, sand, snags

Canopy: open; Bank Stability: fair;   Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: open fields, forested, adj to Rt 280

Other: fish, crayfish, clams / mussels, macrophytes, waterfowl; orange floc running into stream from ditch

	Genus	Tolerance Value	Amount
	Gammarus	6	73
*	Baetis	6	9
*	Cheumatopsyche	5	4
*	Hydropsyche	4	4
	Stenelmis	5	3
	Cricotopus	7	2
	Enallagma	9	2
*	Ceratopsyche	4	1
	Hetaerina	6	1
	Macronychus	2	1

* (EPT organism)   *Taxa Richness:* 10   *Population:* 100

Hilsenhoff Biotic Index (HBI):   5.87   *# Scrapers:* 2

% Sensitive EPT: 9.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 10.0%   *Attribute 3 genera:* 1

HGMI Rating: **28.11**   **Fair**

Habitat Analysis: 146   Suboptimal   USEPA Protocol

Observations: Water temp: 21.84 C; Cond: 754 umhos; DO: 9.99 mg/L; pH: 7.75 SU

Clarity: clear; Flow Rate: fast;   Width/Depth: 40' / < 1'; Substrate: cobble, gravel, sand, root mats

Canopy: partly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, grasses, weeds, vines

Stream Gradient: High Gradient Stream;   Land Uses: commercial, suburban

Pipes / Ditches: storm sewers, flowing

Other: waterfowl, periphytes, purple loosestrife, trash, oil sheen - petroleum odor

	Genus	*Tolerance Value*	*Amount*
*	Baetis	6	26
*	Hydropsyche	4	19
	Gammarus	6	8
*	Cheumatopsyche	5	7
*	Glossosoma	0	7
	Simulium	6	4
*	Ceratopsyche	4	3
	Corydalus	4	3
	Macronychus	2	3
	Promoresia	2	3
*	Apatania	3	2
*	Chimarra	4	2
*	Ephemerella	1	2
*	Perlidae	1	2
	Stenelmis	5	2
*	Acroneuria	0	1
	Antocha	3	1
	Cambarus	6	1
	Cricotopus	7	1
*	Isonychia	2	1
	Physella	9.1	1
	Stylogomphus	1	1

(EPT organism)   *Taxa Richness:* 22   *Population:* 100

Hilsenhoff Biotic Index (HBI): 4.31   *# Scrapers:* 6

% Sensitive EPT: 43.0%   *Attribute 2 genera:* 1

% Non-Insect Taxa: 13.6%   *Attribute 3 genera:* 7

HGMI Rating: **63.01**   **Excellent**

Habitat Analysis: 154   Suboptimal   USEPA Protocol

Observations: Water temp: 17.26 C; Cond: 217 umhos; DO: 8.29 mg/L; pH: 7.17 SU

Clarity: clear; Flow Rate: fast;   Width/Depth: 22'/<1'; Substrate: cobble, gravel, sand, undercut banks

Canopy: mostly open; Bank Stability: poor;   Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers

Other: frogs, crayfish, periphytes; deeply undercut left bank

AMNET Site # **AN0240**   **Stream Name:** **Rockaway River**

Location: **outlet of Longwood Lk (Blue Rd); Jefferson Twp; Morris County**

Collection Date: *9/29/2008*   **USGS Topo Map:** **Dover**

	Genus	Tolerance Value	Amount
	Stenelmis	5	26
*	Cheumatopsyche	5	18
	Gammarus	6	15
	Musculium	5	6
	Simulium	6	6
	Cricotopus	7	4
*	Maccaffertium	3	4
*	Chimarra	4	3
	Nigronia	2	2
	Polypedilum	6	2
	Pyralidae	5	2
	Rheotanytarsus	6	2
	Argia	6	1
	Dugesia	4	1
*	Hydropsyche	4	1
	Lymnaeidae	6	1
	Naididae	7	1
*	Oecetis	8	1
	Physella	9.1	1
	Pisidium	6.8	1
	Psectrocladius	8	1
	Tanytarsus	6	1

(EPT organism)   *Taxa Richness:* 22   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.31   *# Scrapers:* 4

% Sensitive EPT: 8.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 31.8%   *Attribute 3 genera:* 2

HGMI Rating: **35.00**   **Fair**

Habitat Analysis: 170   Optimal   USEPA Protocol

Observations: Water temp: 17.81 C; Cond: 303 umhos; DO: 8.26 mg/L; pH: 7.28 SU

Clarity: clear; Flow Rate: fast;   Width/Depth: 41'/<1'; Substrate: cobble, gravel, sand, snags

Canopy: open; Bank Stability: good;   Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: forested

Downstream of Impoundment: Longwood Lake

Other: macrophytes, filamentous algae

AMNET Site # AN0241   *Stream Name:* **Rockaway River**

Location: **Berkshire Valley Rd; Jefferson Twp; Morris County**

Collection Date: *9/29/2008*   *USGS Topo Map:* **Dover**

Genus	Tolerance Value	Amount
Gammarus	6	45
Microtendipes	7	11
Macromia	2	6
Trichocorixa	9	5
Dubiraphia	6	4
Caecidotea	8	3
Dicrotendipes	8	3
Gyraulus	6	2
Hagenius	3	2
Ischnura	9	2
* Mystacides	4	2
Polypedilum	6	2
* Baetis	6	1
* Cheumatopsyche	5	1
Enallagma	9	1
* Hydroptila	6	1
* Maccaffertium	3	1
Macronychus	2	1
* Oecetis	8	1
Peltodytes	5	1
Pisidium	6.8	1
Prostoma	7	1
* Pseudostenophylax	4	1
Tanytarsus	6	1
Thienemanniella	6	1

* (EPT organism)   *Taxa Richness:* 25   *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.06   *# Scrapers:* 5

% Sensitive EPT: 7.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 20.0%   *Attribute 3 genera:* 5

HGMI Rating: **43.65**   **Good**

Habitat Analysis: 143   Suboptimal   USEPA Protocol

Observations: Water temp: 17.13 C; Cond: 249 umhos;   DO: 7.56 mg/L; pH: 7.12 SU

Clarity: slightly turbid; Flow Rate: moderate;   Width/Depth: 43'/3-4'; Substrate: cobble, gravel, sand, silt, snags

Canopy: open; Bank Stability: good;   Bank Vegetation: trees, shrubs, vines, lawn

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Pipes / Ditches: storm sewers

Other: macrophytes; "trout stocked waters", flooded banks

AMNET Site # AN0242   *Stream Name:* **Green Pond Bk**

Location: **Mt Pleasant Tpk & Rt 15; Wharton Boro; Morris County**

Collection Date: *9/29/2008*   *USGS Topo Map:* **Dover**

	Genus	Tolerance Value	Amount
	Gammarus	6	26
	Optioservus	4	8
*	Baetis	6	7
	Psephenus	4	7
	Stenelmis	5	7
	Trichocorixa	9	7
	Cura	4	5
	Cricotopus	7	4
*	Isonychia	2	4
	Helisoma	7	3
	Pisidium	6.8	3
*	Ceratopsyche	4	2
	Dubiraphia	6	2
*	Stenacron	4	2
	Tanytarsus	6	2
	Tubifex	10	2
	Aulodrilus	8	1
*	Cheumatopsyche	5	1
	Limnodrilus	10	1
*	Litobrancha	0	1
	Nais	8	1
	Nanocladius	3	1
*	Oecetis	8	1
	Pleurocera	7	1
*	Psychomyia	2	1

* (EPT organism)   *Taxa Richness:* 25   *Population:* 100

Hilsenhoff Biotic Index (HBI):	5.64	*# Scrapers:* 6
% Sensitive EPT:	16.0%	*Attribute 2 genera:* 0
% Non-Insect Taxa:	36.0%	*Attribute 3 genera:* 2

HGMI Rating: **38.35**   **Fair**

Habitat Analysis: 161   Optimal   USEPA Protocol

Observations: Water temp: 17.79 C; Cond: 281 umhos; DO: 8.67 mg/L; pH: 7.10 SU

Clarity: clear, cedar-brown; Flow Rate: fast;   Width/Depth: 36'/1'; Substrate: cobble, gravel, sand

Canopy: open; Bank Stability: good;   Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: commercial, forested

Other: crayfish, macrophytes, periphytes, sampled downstream of small feeder stream

	Genus	*Tolerance Value*	*Amount*
	Gammarus	6	29
	Pleuroceridae	6	10
	Ferrissia	7	9
	Nais	8	9
*	Baetis	6	5
	Prostoma	7	5
*	Cheumatopsyche	5	4
*	Glossosoma	0	4
	Optioservus	4	3
	Petrophila	5	3
*	Acerpenna	4	2
*	Ceratopsyche	4	2
*	Hydropsyche	4	2
	Psephenus	4	2
	Cricotopus	7	1
	Eclipidrilus	8	1
	Enchytraeidae	10	1
	Helisoma	7	1
*	Maccaffertium	3	1
	Microcylloepus	2	1
	Microtendipes	7	1
*	Mystacides	4	1
	Rheotanytarsus	6	1
*	Stenacron	4	1
	Stenelmis	5	1

(EPT organism)   *Taxa Richness:* 25   *Population:*   100

Hilsenhoff Biotic Index (HBI):   5.76   *# Scrapers:*   8

% Sensitive EPT: 14.0%   *Attribute 2 genera:*   2

% Non-Insect Taxa: 32.0%   *Attribute 3 genera:*   3

HGMI Rating: **47.40**   **Good**

Habitat Analysis: 116   Suboptimal   USEPA Protocol

Observations: Water temp: 22.66 C; Cond: 615 umhos;   DO: 11.48 mg/L; pH: 8.65 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 30' / < 1'; Substrate: cobble, gravel, sand

Canopy: mostly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, weeds, vines

Stream Gradient: High Gradient Stream;   Land Uses: commercial

Pipes / Ditches: 3' concrete storm sewers

Other: crayfish, trash, R.R. tracks

	Genus	Tolerance Value	Amount
*	Hydropsyche	4	24
	Gammarus	6	13
	Caecidotea	8	11
	Calopteryx	6	9
	Stenelmis	5	5
*	Cheumatopsyche	5	4
	Microtendipes	7	4
*	Lype	2	3
*	Baetis	6	2
	Boyeria	2	2
*	Lepidostoma	1	2
*	Mystacides	4	2
*	Acroneuria	0	1
	Aeshna	5	1
	Antocha	3	1
*	Chimarra	4	1
	Corixidae	9	1
*	Glossosoma	0	1
*	Hydatophylax	2	1
	Macronychus	2	1
	Menetus	6	1
	Nigronia	2	1
	Ophiogomphus	1	1
	Optioservus	4	1
	Parametriocnemus	5	1
	Polypedilum	6	1
	Psephenus	4	1
	Rhagovelia	9	1
	Tipula	4	1
	Tubifex	10	1
	Tvetenia	5	1

* (EPT organism)   *Taxa Richness:* 31   *Population:*   100

Hilsenhoff Biotic Index (HBI):   5.02   *# Scrapers:*   5

% Sensitive EPT: 13.0%   *Attribute 2 genera:*   2

% Non-Insect Taxa: 12.9%   *Attribute 3 genera:*   10

HGMI Rating: **60.63**   **Good**

Habitat Analysis: 137   Suboptimal   USEPA Protocol

Observations: Water temp: 18.22 C;   Cond: 317 umhos;   DO: 7.99 mg/L; pH: 6.49 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 15' / < 1'; Substrate: cobble, gravel, sand, root mats, undercut banks

Canopy: mostly closed; Bank Stability: fair;   Bank Vegetation: trees, shrubs, vines

Stream Gradient: High Gradient Stream;   Land Uses: suburban, industrial

Pipes / Ditches: storm sewers

Other: fish, crayfish, macrophytes, purple loosestrife

AMNET Site # **AN0245**   *Stream Name:* **Beaver Bk**

Location: **Meriden Rd; Rockaway Twp; Morris County**

Collection Date: *9/15/2008*   *USGS Topo Map:* **Boonton**

	Genus	Tolerance Value	Amount
*	Cheumatopsyche	5	21
*	Dolophilodes	0	9
*	Diplectrona	0	7
*	Eurylophella	4	5
	Promoresia	2	5
*	Ceratopsyche	4	4
*	Chimarra	4	4
*	Maccaffertium	3	4
*	Paragnetina	1	4
*	Triaenodes	6	4
*	Hydatophylax	2	3
*	Oecetis	8	3
	Polypedilum	6	3
*	Pteronarcys	0	3
*	Baetis	6	2
	Ectopria	5	2
*	Hydropsyche	4	2
*	Tallaperla	0	2
*	Acroneuria	0	1
	Ancylidae	6	1
	Clinocera	6	1
	Dicranota	3	1
	Gammarus	6	1
	Lumbriculus	8	1
	Macronychus	2	1
	Micropsectra	7	1
	Nigronia	2	1
	Parametriocnemus	5	1
	Rhagovelia	9	1
	Rheotanytarsus	6	1
	Simulium	6	1

* (EPT organism)   *Taxa Richness:* 31   *Population:* 100

Hilsenhoff Biotic Index (HBI): 3.51   *# Scrapers:* 6

% Sensitive EPT: 51.0%   *Attribute 2 genera:* 5

% Non-Insect Taxa: 9.7%   *Attribute 3 genera:* 9

HGMI Rating: **80.91**   **Excellent**

Habitat Analysis: 167   Optimal   USEPA Protocol

Observations: Water temp: 21.06 C; Cond: 53 umhos; DO: 8.38 mg/L; pH: 6.68 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 20'/<1'; Substrate: cobble, gravel, sand, boulder, root mats

Canopy: closed; Bank Stability: good; Bank Vegetation: trees, shrubs, lawn

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Other: water snake, fish, periphytes

Genus	Tolerance Value	Amount
Trichocorixa	9	35
Gammarus	6	25
Polypedilum	6	6
Tanytarsus	6	4
Caecidotea	8	3
Enallagma	9	3
Limnodrilus	10	3
Amnicola	4.8	2
Musculium	5	2
Prostoma	7	2
Sympetrum	4	2
Ancyronyx	2	1
* Baetis	6	1
Calopteryx	6	1
Clinotanypus	8	1
Dicrotendipes	8	1
Dubiraphia	6	1
Erythemis	10	1
Gillia	8	1
* Maccaffertium	3	1
Peltodytes	5	1
Phaenopsectra	7	1
Physella	9.1	1
Tubifex	10	1

(EPT organism)   *Taxa Richness:* 24   *Population:* 100

Hilsenhoff Biotic Index (HBI): 7.36   *# Scrapers:* 5

% Sensitive EPT: 2.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 37.5%   *Attribute 3 genera:* 2

HGMI Rating: **28.23**   **Fair**

Habitat Analysis: 120   Suboptimal   USEPA Protocol

Observations: Water temp: 22.03 C; Cond: 239 umhos; DO: 5.99 mg/L; pH: 6.79 SU

Clarity: slightly turbid; Flow Rate: slow; Width/Depth: 48'/4'; Substrate: mud, silt, snags

Canopy: partly open; Bank Stability: good; Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream; Land Uses: suburban, commercial

Other: trash, fish, macrophytes; adj to Rt 80

AMNET Site # **AN0247**   **Stream Name:** **Den Bk**

Location: **Mt Pleasant Tpk; Denville Twp; Morris County**

Collection Date: *9/8/2008*   **USGS Topo Map:** **Mendham**

Genus	Tolerance Value	Amount
* Cheumatopsyche	5	24
* Hydropsyche	4	17
Gammarus	6	16
Polypedilum	6	7
Eclipidrilus	8	5
* Chimarra	4	4
Macronychus	2	4
Stenelmis	5	4
Antocha	3	3
Rhagovelia	9	3
Menetus	6	2
Promoresia	2	2
Tanytarsus	6	2
Caecidotea	8	1
* Ceratopsyche	4	1
Corydalus	4	1
* Heterocloeon	2	1
Stylodrilus	10	1
Stylogomphus	1	1
Thienemanniella	6	1

(EPT organism)   **Taxa Richness:** 20   **Population:** 100

Hilsenhoff Biotic Index (HBI): 5.09   *# Scrapers:* 5

% Sensitive EPT: 5.0%   *Attribute 2 genera:* 1

% Non-Insect Taxa: 25.0%   *Attribute 3 genera:* 3

HGMI Rating: **39.80**   **Fair**

Habitat Analysis: 138   Suboptimal   USEPA Protocol

Observations: Water temp: 21.00 C; Cond: 252 umhos; DO: 8.21 mg/L; pH: 6.88 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 25' / < 1'; Substrate: cobble, gravel, sand, root mats

Canopy: mostly closed; Bank Stability: fair; Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream; Land Uses: suburban, community park

Pipes / Ditches: storm sewers

Other: fish, crayfish; sewage odor

AMNET Site # **AN0248**   **Stream Name:** **Rockaway River**

Location: **Pocono Rd at St Clair Hosp; Denville Twp; Morris County**

Collection Date: *9/15/2008*   **USGS Topo Map:** **Boonton**

Genus	Tolerance Value	Amount
Gammarus	6	39
Optioservus	4	20
Stenelmis	5	16
Pleurocera	7	5
* Baetis	6	4
* Cheumatopsyche	5	2
Corbicula	4	2
Eclipidrilus	8	2
Psephenus	4	2
Ferrissia	7	1
Gomphus	5	1
Helobdella	8	1
Leptoxis	1.6	1
Physella	9.1	1
Pisidium	6.8	1
Polypedilum	6	1
Stylaria	8	1

(EPT organism)   **Taxa Richness:** 17   **Population:** 100

Hilsenhoff Biotic Index (HBI): 5.46   **# Scrapers:** 5

% Sensitive EPT: 4.0%   **Attribute 2 genera:** 0

% Non-Insect Taxa: 58.8%   **Attribute 3 genera:** 2

HGMI Rating: **26.75**   **Fair**

Habitat Analysis: 140   Suboptimal   USEPA Protocol

Observations: Water temp: 21.5 C; Cond: 372 umhos; DO: 7.38 mg/L; pH: 7.3 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 50' / <1'; Substrate: cobble, gravel, sand

Canopy: partly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, lawn

Stream Gradient: High Gradient Stream;   Land Uses: commercial, suburban

Pipes / Ditches: storm sewers

Other: adjacent to hospital, trash, fish, clams / mussels

AMNET Site # **AN0249**   **Stream Name:** **Stony Bk**

Location: **Valley Rd; Boonton Twp; Morris County**

Collection Date: *9/15/2008*   **USGS Topo Map:** **Boonton**

Genus	Tolerance Value	Amount
Gammarus	6	48
* Oecetis	8	6
Eclipidrilus	8	5
Tabanus	5	5
Musculium	5	4
Ectopria	5	3
Macronychus	2	3
Menetus	6	3
Calopteryx	6	2
* Cheumatopsyche	5	2
Cura	4	2
Gomphus	5	2
Microtendipes	7	2
Polypedilum	6	2
Belostoma	9.8	1
Caecidotea	8	1
Cricotopus	7	1
Gillia	8	1
Hemerodromia	6	1
Nais	8	1
Paratanytarsus	6	1
Physella	9.1	1
Stenelmis	5	1
Tanytarsus	6	1
Tubifex	10	1

(EPT organism)   **Taxa Richness:** 25   **Population:** 100

Hilsenhoff Biotic Index (HBI): 6.09   **# Scrapers:** 5

% Sensitive EPT: 6.0%   **Attribute 2 genera:** 0

% Non-Insect Taxa: 40.0%   **Attribute 3 genera:** 1

HGMI Rating: **30.62**   **Fair**

Habitat Analysis: 130   Suboptimal   USEPA Protocol

Observations: Water temp: 23.86 C; Cond: 224 umhos; DO: 8.38 mg/L; pH: 6.68 SU

Clarity: clear; Flow Rate: slow; Width/Depth: 41'/<1-2'; Substrate: gravel, sand, silt

Canopy: mostly open; Bank Stability: fair; Bank Vegetation: shrubs, grasses, weeds

Stream Gradient: High Gradient Stream; Land Uses: forested, suburban

Other: fish, macrophytes

AMNET Site # AN0250   *Stream Name:* **Rockaway River**

Location: **under Morris Ave; Boonton Twp; Morris County**

Collection Date: *9/22/2008*   *USGS Topo Map:* **Boonton**

	Genus	*Tolerance Value*	*Amount*
*	Heterocloeon	2	32
	Gammarus	6	21
*	Isonychia	2	9
*	Chimarra	4	8
*	Ceratopsyche	4	5
	Simulium	6	4
	Caecidotea	8	3
*	Cheumatopsyche	5	3
	Polypedilum	6	3
	Ancylidae	6	2
	Macronychus	2	2
	Cricotopus	7	1
	Eukiefferiella	8	1
*	Hydropsyche	4	1
	Ischnura	9	1
*	Maccaffertium	3	1
	Rheotanytarsus	6	1
	Stenelmis	5	1
	Tvetenia	5	1

* (EPT organism)   *Taxa Richness:*   19   *Population:*   100

Hilsenhoff Biotic Index (HBI):   4.04   *# Scrapers:*   5

% Sensitive EPT: 50.0%   *Attribute 2 genera:*   1

% Non-Insect Taxa: 15.8%   *Attribute 3 genera:*   2

HGMI Rating: **54.06**   **Good**

Habitat Analysis: 158   Suboptimal   USEPA Protocol

Observations: Water temp: 16.51 C; Cond: 403 umhos; DO: 9.64 mg/L; pH: 7.83 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 50' / <1-1'; Substrate: cobble, gravel, root mats

Canopy: mostly open; Bank Stability: good;   Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream;   Land Uses: commercial

Pipes / Ditches: storm sewers

Other: periphytes, sewage odor, gage height 1.95 feet

Genus	Tolerance Value	Amount
Paratanytarsus	6	34
Polypedilum	6	18
* Cheumatopsyche	5	12
Cricotopus	7	11
Cura	4	8
Pristina	8	5
Dicrotendipes	8	2
Nais	8	2
Rheotanytarsus	6	2
* Baetis	6	1
Helobdella	8	1
* Hydropsyche	4	1
Limnodrilus	10	1
Placobdella	8	1
Simulium	6	1

* (EPT organism)

Taxa Richness: 15	*Population:*	100
Hilsenhoff Biotic Index (HBI): 6.07	*# Scrapers:*	0
% Sensitive EPT: 1.0%	*Attribute 2 genera:*	0
% Non-Insect Taxa: 40.0%	*Attribute 3 genera:*	1

HGMI Rating: **23.67** **Fair**

Habitat Analysis: 146 Suboptimal USEPA Protocol

Observations: Water temp: 20.40 C; Cond: 714 umhos; DO: 6.84 mg/L; pH: 7.39 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 45' / 1'; Substrate: cobble, sand, gravel

Canopy: partly open; Bank Stability: fair; Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream; Land Uses: suburban, forested

Pipes / Ditches: storm sewers

Other: fish, macrophytes, periphytes, filamentous algae, waterfowl, orange metal floc flowing from storm sewer

AMNET Site # **AN0252**   **Stream Name:** **Crooked Bk**

Location: **Hemlock Rd & Glen Terr; Montville Twp; Morris County**

Collection Date: *9/22/2008*   **USGS Topo Map:** **Pompton Plains**

	Genus	*Tolerance Value*	*Amount*
	Ectopria	5	15
*	Eurylophella	4	13
*	Cheumatopsyche	5	9
*	Hydropsyche	4	8
*	Dolophilodes	0	5
	Stylogomphus	1	4
*	Acroneuria	0	3
*	Diplectrona	0	3
	Lanthus	5	3
*	Mystacides	4	3
	Pisidium	6.8	3
	Stenelmis	5	3
	Caecidotea	8	2
	Cricotopus	7	2
	Rhagovelia	9	2
	Simulium	6	2
	Boyeria	2	1
	Dubiraphia	6	1
	Enchytraeidae	10	1
*	Glossosoma	0	1
*	Hydropsychidae	4	1
*	Maccaffertium	3	1
*	Micrasema	2	1
	Microtendipes	7	1
	Microvelia	6	1
	Nigronia	2	1
*	Perlidae	1	1
	Planorbidae	6	1
	Polypedilum	6	1
	Promoresia	2	1
	Prostoma	7	1
	Psephenus	4	1
	Tanytarsus	6	1
	Tipula	4	1
	Tubificidae	10	1
	Tvetenia	5	1

(EPT organism)   *Taxa Richness:* 36   *Population:*   100

Hilsenhoff Biotic Index (HBI):   4.23   *# Scrapers:*   9

% Sensitive EPT: 31.0%   *Attribute 2 genera:*   3

% Non-Insect Taxa: 16.7%   *Attribute 3 genera:*   12

HGMI Rating: **71.21**   **Excellent**

Habitat Analysis: 166   Optimal   USEPA Protocol

Observations: Water temp: 14.85 C; Cond: 234 umhos; DO: 8.00 mg/L; pH: 7.16 SU

  Clarity: clear; Flow Rate: slow; Width/Depth: 10'/<1'; Substrate: cobble, gravel, boulders

  Canopy: mostly closed; Bank Stability: good; Bank Vegetation: trees, shrubs

  Stream Gradient: High Gradient Stream;   Land Uses: forested

  Other: frogs

AMNET Site # **AN0253**   **Stream Name:** **Crooked Bk**

Location: **Vista Rd; Montville Twp; Morris County**

Collection Date: *9/22/2008*   **USGS Topo Map:** **Boonton**

	Genus	Tolerance Value	Amount
	Stenelmis	5	16
	Caecidotea	8	14
*	Maccaffertium	3	14
	Limnodrilus	10	12
*	Hydropsyche	4	9
	Stylaria	8	6
	Tubifex	10	5
	Nais	8	4
	Pisidium	6.8	4
	Slavina	7	4
*	Cheumatopsyche	5	3
	Gammarus	6	3
	Boyeria	2	1
	Cura	4	1
*	Oecetis	8	1
	Pristina	8	1
	Psephenus	4	1
	Tanytarsus	6	1

(EPT organism)   **Taxa Richness:** 18   **Population:** 100

Hilsenhoff Biotic Index (HBI): 6.40   **# Scrapers:** 3

% Sensitive EPT: 15.0%   **Attribute 2 genera:** 0

% Non-Insect Taxa: 55.6%   **Attribute 3 genera:** 2

HGMI Rating: **22.31**   **Fair**

Habitat Analysis: 113   Suboptimal   USEPA Protocol

Observations: Water temp: 17.33 C; Cond: 202 umhos;   DO: 7.13 mg/L; pH: 6.89 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 17' / <1'-1'; Substrate: cobble, sand, silt

Canopy: closed; Bank Stability: poor;   Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Pipes / Ditches: storm sewers

Downstream of Impoundment: Lake Valhalla

Other: fish, macrophytes, periphytes; milky discharge & trash in stream

AMNET Site # **AN0254**   **Stream Name:** **Crooked Bk**

Location: **River Rd; Montville Twp; Morris County**

Collection Date: *9/22/2008*   **USGS Topo Map:** **Pompton Plains**

Genus	Tolerance Value	Amount
Stenelmis	5	18
Gammarus	6	12
* Hydropsyche	4	8
Polypedilum	6	8
Caecidotea	8	7
Rheotanytarsus	6	6
Prosimulium	2	5
* Baetis	6	4
Cricotopus	7	4
Cura	4	4
Simulium	6	4
* Cheumatopsyche	5	3
Rhagovelia	9	3
Calopteryx	6	2
* Ceratopsyche	4	2
Macronychus	2	2
Antocha	3	1
* Chimarra	4	1
Cladotanytarsus	7	1
Orconectes	6	1
Parametriocnemus	5	1
Prostoma	7	1
Rheumatobates	8	1
Tanytarsus	6	1

* (EPT organism)   *Taxa Richness:* 24   *Population:* 100

Hilsenhoff Biotic Index (HBI):   5.48   *# Scrapers:* 2

% Sensitive EPT: 5.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 20.8%   *Attribute 3 genera:* 4

HGMI Rating: **37.92**   **Fair**

Habitat Analysis: 154   Suboptimal   USEPA Protocol

Observations: Water temp: 16.32 C; Cond: 586 umhos; DO: 10.30 mg/L; pH: 8.23 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 24'/<1'; Substrate: cobble, gravel, sand, silt, root mats

Canopy: partly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: commercial, forested

Pipes / Ditches: storm sewers (on L.B.)

Other: fish, crayfish, periphytes, garter snake

	Genus	Tolerance Value	Amount
	Gammarus	6	30
*	Ceratopsyche	4	14
*	Stenonema	3	13
*	Cheumatopsyche	5	9
	Simulium	6	6
*	Heterocloeon	2	5
	Pisidium	6.8	3
	Planorbidae	6	3
	Argia	6	2
	Cardiocladius	5	2
	Ischnura	9	2
*	Acentrella	4	1
*	Apatania	3	1
*	Chimarra	4	1
	Eukiefferiella	8	1
*	Hydropsyche	4	1
*	Isonychia	2	1
*	Mystacides	4	1
*	Oecetis	8	1
	Physella	9.1	1
	Rheotanytarsus	6	1
*	Triaenodes	6	1

* (EPT organism)   *Taxa Richness:* 22   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.03   *# Scrapers:* 5

% Sensitive EPT: 25.0%   *Attribute 2 genera:* 2

% Non-Insect Taxa: 18.2%   *Attribute 3 genera:* 4

HGMI Rating: **51.67**   **Good**

Habitat Analysis: 166   Optimal   USEPA Protocol

Observations: Water temp: 15.95 C;   Cond: 258 umhos;   DO: 8.5 mg/L; pH: 6.65 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 19'/<1'; Substrate: cobble, gravel, snags, root mats

Canopy: mostly open; Bank Stability: good;   Bank Vegetation: trees

Stream Gradient: High Gradient Stream;   Land Uses: forested

Downstream of Impoundment: Greenwood Lake

Other: fish, periphytes

AMNET Site # **AN0255C**   **Stream Name:** **Belcher Ck**

Location: **Union Valley Rd; West Milford Twp; Passaic County**

Collection Date: *10/15/2008*   **USGS Topo Map:** **Greenwood Lake**

Genus	Tolerance Value	Amount
Helisoma	7	22
Gammarus	6	15
Gyraulus	6	12
Nanocladius	3	12
Enallagma	9	7
Physella	9.1	5
Nais	8	4
Cura	4	3
Erythemis	10	2
Ischnura	9	2
Planorbidae	6	2
Pristina	8	2
Pristinella	10	2
Simulium	6	2
Stylaria	8	2
Amnicola	4.8	1
Dicrotendipes	8	1
Dugesia	4	1
Fossaria	6	1
Musculium	5	1
Stylodrilus	10	1

(EPT organism)   *Taxa Richness:* 21   *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.56   *# Scrapers:* 6

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 71.4%   *Attribute 3 genera:* 0

HGMI Rating: **20.05**   **Poor**

Habitat Analysis: 123   Suboptimal   USEPA Protocol

Observations: Water temp: 17.55 C; Cond: 303 umhos; DO: 8.52 mg/L; pH: 7.94 SU

Clarity: turbid, greenish color; Flow Rate: slow;   Width/Depth: 58' / <1'; Substrate: cobble, gravel, silt

Canopy: open; Bank Stability: fair; Bank Vegetation: weeds, lawn

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers

Downstream of Impoundment: Pinecliff Lake

Other: fish, frogs, macrophytes, filamentous algae

Location: **Union Valley Rd; West Milford Twp; Passaic County**

Collection Date: *10/15/2008*   *USGS Topo Map:* **Greenwood Lake**

	Genus	Tolerance Value	Amount
*	Hydropsyche	4	13
*	Baetis	6	9
	Ectopria	5	6
	Pseudorthocladius	0	6
*	Cheumatopsyche	5	5
	Gammarus	6	5
	Stylodrilus	10	5
*	Leuctra	0	4
*	Acerpenna	4	2
	Calopteryx	6	2
*	Chimarra	4	2
	Corydalus	4	2
	Cricotopus	7	2
	Rhagovelia	9	2
	Simulium	6	2
	Tipula	4	2
*	Acroneuria	0	1
	Boyeria	2	1
	Chrysops	6	1
*	Eurylophella	4	1
	Microvelia	6	1
	Nais	8	1
	Oulimnius	4	1
*	Perlidae	1	1
	Stylogomphus	1	1

* (EPT organism)   *Taxa Richness:* 25 *Population:* 78

Hilsenhoff Biotic Index (HBI):   4.63   *# Scrapers:* 3

% Sensitive EPT: 25.6%   *Attribute 2 genera:* 3

% Non-Insect Taxa: 12.0%   *Attribute 3 genera:* 8

HGMI Rating: **60.47**   **Good**

Habitat Analysis: 146   Suboptimal   USEPA Protocol

Observations: Water temp: 13.86 C; Cond: 126 umhos; DO: 9.40 mg/L; pH: 6.83 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 15' / <1'; Substrate: cobble, gravel, sand, silt

Canopy: closed; Bank Stability: fair; Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers

Other: fish, periphytes, oil sheen on RB

AMNET Site # **AN0256**   *Stream Name:* **Wanaque River**

Location: **behind park at 4th St and Back Beach Rd; Wanaque Boro; Passaic County**

Collection Date: *10/9/2008*   *USGS Topo Map:* **Wanaque**

	Genus	Tolerance Value	Amount
	Gammarus	6	29
	Stictochironomus	9	15
	Trichocorixa	9	15
	Chironomus	10	8
	Caecidotea	8	6
	Microtendipes	7	6
	Prostoma	7	6
	Limnodrilus	10	3
	Physella	9.1	2
	Tanytarsus	6	2
	Cricotopus	7	1
	Cura	4	1
	Ferrissia	7	1
*	Lype	2	1
*	Mystacides	4	1
	Phaenopsectra	7	1
	Procladius	9	1
	Tubifex	10	1

* (EPT organism)   *Taxa Richness:* 18   *Population:* 100

Hilsenhoff Biotic Index (HBI): 7.66   *# Scrapers:* 3

% Sensitive EPT: 2.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 44.4%   *Attribute 3 genera:* 2

HGMI Rating: **21.09** **Fair**

Habitat Analysis: 124 Suboptimal   USEPA Protocol

Observations: Water temp: 15.76 C; Cond: 309 umhos; DO: 7.91 mg/L; pH: 6.93 SU

Clarity: slightly turbid, greenish; Flow Rate: slow; Width/Depth: 63'/3+'; Substrate: cobble, gravel, sand, silt, snags

Canopy: mostly open; Bank Stability: fair; Bank Vegetation: trees, shrubs, weeds, lawn

Stream Gradient: High Gradient Stream; Land Uses: forested, ball park

Other: frogs

AMNET Site # **AN0256A**   **Stream Name:** **Meadow Bk**

Location: **Warren Hagstrom Blvd; Wanaque Boro; Passaic County**

Collection Date: *10/2/2008*   **USGS Topo Map:** **Wanaque**

	Genus	Tolerance Value	Amount
*	Ceratopsyche	4	16
	Gammarus	6	12
*	Glossosoma	0	12
	Stenelmis	5	11
	Cricotopus	7	9
	Dugesia	4	8
*	Cheumatopsyche	5	6
	Simulium	6	6
*	Baetis	6	5
*	Hydropsyche	4	3
*	Hydroptilidae	4	3
	Prostoma	7	3
	Lumbricidae	10	2
	Corynoneura	4	1
	Rheotanytarsus	6	1
	Tipulidae	3	1
	Tvetenia	5	1

(EPT organism)   *Taxa Richness:* 17   *Population:* 100

Hilsenhoff Biotic Index (HBI): 4.65   *# Scrapers:* 2

% Sensitive EPT: 20.0%   *Attribute 2 genera:* 1

% Non-Insect Taxa: 23.5%   *Attribute 3 genera:* 1

HGMI Rating: **35.97**   **Fair**

Habitat Analysis: 125   Suboptimal   USEPA Protocol

Observations: Water temp: 14.98 C; Cond: 315 umhos; DO: 9.58 mg/L; pH: 7.43 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 20'/<1'; Substrate: cobble, gravel, sand

Canopy: partly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, grasses, weeds, lawn

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Other: periphytes, filamentous algae, new bridge into Wanaque reserve, housing community

AMNET Site # **AN0257**   **Stream Name:** **Wanaque River**

Location: **Wanaque Ave; Pompton Lakes Boro; Passaic County**

Collection Date: *10/9/2008*   **USGS Topo Map:** **Wanaque**

	Genus	Tolerance Value	Amount
*	Cheumatopsyche	5	24
*	Ceratopsyche	4	19
*	Chimarra	4	13
*	Maccaffertium	3	12
	Simulium	6	11
*	Hydropsyche	4	4
*	Baetis	6	3
	Cardiocladius	5	2
*	Hydropsychidae	4	2
*	Isonychia	2	2
	Stenelmis	5	2
	Stictochironomus	9	2
	Antocha	3	1
	Dugesia	4	1
*	Rhyacophila	1	1
*	Taeniopteryx	2	1

(EPT organism)   *Taxa Richness:* 16   *Population:* 100

Hilsenhoff Biotic Index (HBI):   4.44   **# Scrapers:**   2

% Sensitive EPT: 32.0%   *Attribute 2 genera:*   1

% Non-Insect Taxa: 6.3%   *Attribute 3 genera:*   4

HGMI Rating: **51.13**   **Good**

Habitat Analysis: 140   Suboptimal   USEPA Protocol

Observations: Water temp: 15.72 C; Cond: 314 umhos; DO: 9.17 mg/L; pH: 7.36 SU

   Clarity: clear, greenish; Flow Rate: moderate;   Width/Depth: 83'/<1'; Substrate: cobble, gravel, sand

   Canopy: mostly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, vines

   Stream Gradient: High Gradient Stream;   Land Uses: urban

   Downstream of Impoundment: Lake Inez

   Other: trash, waterfowl, periphytes

	Genus	Tolerance Value	Amount
	Hyalella	8	24
	Corixidae	9	15
*	Leptophlebia	4	10
	Dicrotendipes	8	4
	Ischnura	9	4
	Pisidium	6.8	4
	Planorbidae	6	4
*	Platycentropus	4	4
	Stylaria	8	4
*	Polycentropus	6	3
	Tanytarsus	6	3
	Clinotanypus	8	2
*	Phylocentropus	5	2
	Procladius	9	2
	Caecidotea	8	1
*	Caenis	7	1
*	Callibaetis	9	1
	Chironomus	10	1
	Chrysops	6	1
	Dubiraphia	6	1
*	Eurylophella	4	1
	Helisoma	7	1
*	Hydroptila	6	1
	Microtendipes	7	1
	Peltodytes	5	1
	Phaenopsectra	7	1
*	Ptilostomis	5	1
	Ranatra	7.5	1
	Sympetrum	4	1

(EPT organism)   *Taxa Richness:* 29   *Population:* 100

Hilsenhoff Biotic Index (HBI): 7.13   *# Scrapers:* 6

% Sensitive EPT: 24.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 20.7%   *Attribute 3 genera:* 4

HGMI Rating: **44.08**   **Good**

Habitat Analysis: 110   Suboptimal   USEPA Protocol

Observations: Water temp: 5.20 C; Cond: 332 umhos; DO: 6.83 mg/L; pH: 7.80 SU

Clarity: slightly turbid; Flow Rate: slow;   Width/Depth: 20' / 3'; Substrate: mud, silt, snags

Canopy: open; Bank Stability: fair;   Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: forested

Other: crayfish, macrophytes, large dead snapping turtle

AMNET Site # **AN0259**   *Stream Name:* **Pequannock River**

Location: **Rt 23N nr Canistear Rd; West Milford Twp; Passaic & Morris County**

Collection Date: *10/20/2008*   *USGS Topo Map:* **Newfoundland**

	Genus	Tolerance Value	Amount
	Cricotopus	7	25
*	Taeniopteryx	2	24
*	Ephemerella	1	10
*	Pseudostenophylax	4	10
*	Isonychia	2	6
	Nais	8	6
	Antocha	3	4
	Optioservus	4	3
*	Cheumatopsyche	5	2
*	Leucotrichia	3	2
	Orthocladius	6	2
*	Acentrella	4	1
	Chelifera	6	1
*	Maccaffertium	3	1
	Paratanytarsus	6	1
*	Psychomyia	2	1
	Thienemanniella	6	1

* (EPT organism)   *Taxa Richness:* 17   *Population:* 100

Hilsenhoff Biotic Index (HBI):   4.12   *# Scrapers:* 2

% Sensitive EPT: 55.0%   *Attribute 2 genera:* 1

% Non-Insect Taxa: 5.9%   *Attribute 3 genera:* 5

HGMI Rating: **57.38**   **Good**

Habitat Analysis: 162   Optimal   USEPA Protocol

Observations: Water temp: 5.10 C; Cond: 260 umhos; DO: 13.50 mg/L; pH: 7.72 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 46' / < 1.0'; Substrate: bedrock, cobble, gravel, sand

Canopy: open; Bank Stability: good; Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream;   Land Uses: forested, adj to Rt 23

Pipes / Ditches: storm sewers

Other: fish, periphytes

AMNET Site # AN0260   *Stream Name:* **Mossmans Bk**

Location: **Clinton Rd N of Clinton Res; West Milford Twp; Passaic County**

Collection Date: *10/15/2008*   *USGS Topo Map:* **Newfoundland**

	Genus	Tolerance Value	Amount
*	Lepidostoma	1	11
*	Eurylophella	4	10
*	Hydropsyche	4	10
	Psephenus	4	8
*	Maccaffertium	3	7
*	Micrasema	2	7
	Promoresia	2	7
*	Taeniopteryx	2	6
*	Hydroptila	6	4
	Nigronia	2	4
*	Tallaperla	0	4
*	Paraleptophlebia	1	3
*	Chimarra	4	2
*	Diplectrona	0	2
	Oulimnius	4	2
	Tipula	4	2
*	Acroneuria	0	1
*	Apatania	3	1
*	Eccoptura	1	1
*	Isoperla	2	1
	Lanthus	5	1
*	Leuctra	0	1
*	Lype	2	1
	Parachaetocladius	2	1
*	Perlidae	1	1
	Pisidium	6.8	1
	Simulium	6	1

* (EPT organism)   *Taxa Richness:* 27   *Population:* 100

Hilsenhoff Biotic Index (HBI):   2.72   *# Scrapers:* 7

% Sensitive EPT: 63.0%   *Attribute 2 genera:* 6

% Non-Insect Taxa: 3.7%   *Attribute 3 genera:* 12

HGMI Rating: **87.91**   **Excellent**

Habitat Analysis: 167   Optimal   USEPA Protocol

Observations: Water temp: 13.13 C; Cond: 80 umhos; DO: 9.06 mg/L; pH: 6.21 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 19'/<1'; Substrate: cobble, gravel, sand, snags

Canopy: mostly closed; Bank Stability: fair;   Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream;   Land Uses: forested

Other: frogs, periphytes

AMNET Site # **AN0261**   **Stream Name:** **Clinton Bk**

Location: **La Rue Rd; West Milford Twp; Passaic County**

Collection Date: *10/7/2008*   **USGS Topo Map:** **Newfoundland**

	Genus	Tolerance Value	Amount
	Microtendipes	7	20
*	Mystacides	4	16
	Gammarus	6	9
	Amnicola	4.8	8
*	Platycentropus	4	7
	Stenelmis	5	6
	Ischnura	9	5
	Caecidotea	8	4
	Physella	9.1	4
	Planorbidae	6	4
	Lumbricidae	10	2
	Nais	8	2
	Agabus	5	1
	Basiaeschna	2	1
*	Callibaetis	9	1
	Corixidae	9	1
	Dugesia	4	1
*	Eurylophella	4	1
	Hyalella	8	1
	Hydroporus	5	1
*	Hydroptila	6	1
	Pisidium	6.8	1
*	Polycentropus	6	1
	Rheotanytarsus	6	1
	Stylaria	8	1

(EPT organism)   **Taxa Richness:** 25   **Population:** 100

Hilsenhoff Biotic Index (HBI): 6.07   **# Scrapers:** 6

% Sensitive EPT: 27.0%   **Attribute 2 genera:** 0

% Non-Insect Taxa: 44.0%   **Attribute 3 genera:** 3

HGMI Rating: **38.64** **Fair**

Habitat Analysis: 137   Suboptimal   USEPA Protocol

Observations: Water temp: 12.43 C; Cond: 74 umhos; DO: 7.74 mg/L; pH: 6.84 SU

Clarity: clear; Flow Rate: slow; Width/Depth: 34'/2-3'; Substrate: gravel, sand

Canopy: mostly open; Bank Stability: fair; Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream; Land Uses: forested

Pipes / Ditches: storm sewers

Other: trash, fish, crayfish, macrophytes

	Genus	Tolerance Value	Amount
	Microtendipes	7	17
*	Caenis	7	11
	Dubiraphia	6	10
	Gammarus	6	8
	Ischnura	9	8
	Calopteryx	6	6
*	Hexagenia	6	6
*	Mystacides	4	4
	Limnodrilus	10	3
*	Oxyethira	3	3
*	Stenacron	4	3
*	Centroptilum	2	2
*	Paraleptophlebia	1	2
	Tubifex	10	2
	Aulodrilus	8	1
	Basiaeschna	2	1
*	Callibaetis	9	1
	Dero	10	1
	Dicrotendipes	8	1
*	Eurylophella	4	1
	Hyalella	8	1
	Hydrolimax	4	1
*	Hydroptila	6	1
*	Limnephilidae	4	1
*	Phryganeidae	4	1
	Procladius	9	1
	Prostoma	7	1
	Sialis	4	1
	Tribelos	5	1

(EPT organism)   **Taxa Richness:** 29   **Population:** 100

Hilsenhoff Biotic Index (HBI): 6.33   **# Scrapers:** 4

% Sensitive EPT: 36.0%   **Attribute 2 genera:** 2

% Non-Insect Taxa: 27.6%   **Attribute 3 genera:** 4

HGMI Rating: **47.98**   **Good**

Habitat Analysis: 158   Suboptimal   USEPA Protocol

Observations: Water temp: 10.16 C; Cond: 187 umhos; DO: 7.63 mg/L; pH: 6.77 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 30'/<1'; Substrate: cobble, gravel, silt, root mats

Canopy: mostly open; Bank Stability: good; Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream;   Land Uses: forested

Other: trash, possible beaver dam, macrophytes, periphytes, fish

AMNET Site # **AN0263**   **Stream Name:** **Macopin River**

Location: **Echo Lake Rd; West Milford Twp; Passaic County**

Collection Date: *10/7/2008*   **USGS Topo Map:** **Newfoundland**

Genus	Tolerance Value	Amount
Caecidotea	8	43
Stylaria	8	25
Dugesia	4	11
Cricotopus	7	5
Potthastia	2	4
Gammarus	6	2
Nais	8	2
Aulodrilus	8	1
* Eurylophella	4	1
Glyptotendipes	10	1
Lumbricillus	10	1
Nanocladius	3	1
Prostoma	7	1
Pseudochironomus	5	1
Thienemannimyia	6	1

(EPT organism)   **Taxa Richness:** 15   **Population:** 100

Hilsenhoff Biotic Index (HBI): 7.12   **# Scrapers:** 1

% Sensitive EPT: 1.0%   **Attribute 2 genera:** 0

% Non-Insect Taxa: 53.3%   **Attribute 3 genera:** 1

HGMI Rating: **12.36**   **Poor**

Habitat Analysis: 128   Suboptimal   USEPA Protocol

Observations: Water temp: 16.97 C; Cond: 167 umhos; DO: 7.61 mg/L; pH: 7.32 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 21'/<1'; Substrate: cobble, boulder

Canopy: open; Bank Stability: good;   Bank Vegetation: trees, lawn

Stream Gradient: High Gradient Stream;   Land Uses: forested

Downstream of Impoundment: Echo Lake

Other: excessive filamentous algae, Phragmites blocking stream flow

	Genus	*Tolerance Value*	*Amount*
	Prostoma	7	30
	Caecidotea	8	17
	Pristinella	10	8
*	Eurylophella	4	7
*	Caenis	7	4
	Dicrotendipes	8	4
	Gammarus	6	3
	Helisoma	7	3
	Microtendipes	7	3
	Tanytarsus	6	3
	Alboglossiphonia	8	2
	Argia	6	2
	Fossaria	6	2
	Amnicola	4.8	1
	Ferrissia	7	1
	Hydra	5	1
	Hymanella	4	1
*	Maccaffertium	3	1
	Macromia	2	1
	Musculium	5	1
	Nais	8	1
	Nematoda	6	1
*	Nyctiophylax	5	1
*	Oecetis	8	1
	Valvata	2	1

* (EPT organism)   *Taxa Richness:* 25   *Population:* 100

Hilsenhoff Biotic Index (HBI):   6.92   *# Scrapers:* 7

% Sensitive EPT: 14.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 60.0%   *Attribute 3 genera:* 2

HGMI Rating: **29.99**   **Fair**

Habitat Analysis: 159   Suboptimal   USEPA Protocol

Observations: Water temp: 11.73 C; Cond: 236 umhos;   DO: 8.82 mg/L; pH: 7.16 SU

   Clarity: clear; Flow Rate: slow;   Width/Depth: 53'/1-3'; Substrate: cobble, gravel, sand, snags, boulder

   Canopy: mostly open; Bank Stability: good;   Bank Vegetation: trees, vines, weeds

   Stream Gradient: High Gradient Stream;   Land Uses: forested, adjacent to Route 23

   Other: waterfowl, periphytes, fish; USGS gage 2.2'

AMNET Site # AN0265   *Stream Name:* **Pequannock River**

Location: **Main St (Rt 511); Butler Boro; Morris & Passaic County**

Collection Date: *9/29/2008*   *USGS Topo Map:* **Wanaque**

	Genus	*Tolerance Value*	*Amount*
	Gammarus	6	23
*	Cheumatopsyche	5	14
*	Baetis	6	11
*	Ceratopsyche	4	11
*	Chimarra	4	7
*	Acerpenna	4	6
	Psephenus	4	5
*	Hydropsyche	4	4
*	Maccaffertium	3	3
	Calopteryx	6	2
	Cardiocladius	5	2
	Simulium	6	2
*	Acroneuria	0	1
*	Cloeon	4	1
	Cricotopus	7	1
*	Eurylophella	4	1
*	Hydroptila	6	1
*	Isonychia	2	1
*	Lype	2	1
*	Paragnetina	1	1
	Rheotanytarsus	6	1
	Tubificidae	10	1

* (EPT organism)   *Taxa Richness:* 22   *Population:*   100

Hilsenhoff Biotic Index (HBI):   4.91   *# Scrapers:*   4

% Sensitive EPT: 34.0%   *Attribute 2 genera:*   2

% Non-Insect Taxa: 9.1%   *Attribute 3 genera:*   7

HGMI Rating: **60.94**   **Good**

Habitat Analysis: 132   Suboptimal   USEPA Protocol

Observations: Water temp: 17.92 C; Cond: 258 umhos; DO: 8.37 mg/L; pH: 7.62 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 44'/<1'; Substrate: cobble, gravel, sand, snags

Canopy: mostly open; Bank Stability: fair;   Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: commercial

Pipes / Ditches: storm sewers (flowing)

Other: fish, macrophytes, periphytes, trash

AMNET Site # **AN0266**   **Stream Name:** **Ramapo River**

Location: **Rt 202 near Rt 17; Mahwah Twp; Bergen County**

Collection Date: *10/2/2008*   **USGS Topo Map:** **Ramsey**

Genus	Tolerance Value	Amount
Limnodrilus	10	31
Hydrolimax	4	20
Gammarus	6	13
Caecidotea	8	6
Chironomus	10	5
Quistradrilus	10	5
Tanytarsus	6	5
Glyptotendipes	10	3
Dugesia	4	2
Stictochironomus	9	2
Alboglossiphonia	8	1
Dicrotendipes	8	1
Helisoma	7	1
Ischnura	9	1
Nematoda	6	1
Paratendipes	8	1
Pisidium	6.8	1
Trepobates	8	1

* (EPT organism)

Taxa Richness:	18	*Population:*	100
Hilsenhoff Biotic Index (HBI):	7.63	*# Scrapers:*	1
% Sensitive EPT:	0.0%	*Attribute 2 genera:*	0
% Non-Insect Taxa:	55.6%	*Attribute 3 genera:*	0

HGMI Rating: **14.11** **Poor**

Habitat Analysis: 100 Marginal USEPA Protocol

Observations: Water temp: 15.90 C; Cond: 478 umhos; DO: 6.60 mg/L; pH: 7.15 SU

Clarity: slightly turbid; Flow Rate: slow; Width/Depth: 90'/3-4'; Substrate: mud, snags

Canopy: mostly closed; Bank Stability: poor; Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream; Land Uses: suburban, forested

Other: trash, fish; adjacent to two major highways; USGS gage 2.5'

Genus	Tolerance Value	Amount
Optioservus	4	29
Dugesia	4	14
* Chimarra	4	12
Gammarus	6	8
* Cheumatopsyche	5	7
Simulium	6	7
Cura	4	5
Cricotopus	7	4
Stenelmis	5	4
* Baetis	6	2
Cardiocladius	5	2
* Ceratopsyche	4	2
Ancyronyx	2	1
Hemerodromia	6	1
Musculium	5	1
Rheotanytarsus	6	1

(EPT organism)   *Taxa Richness:* 16   *Population:* 100

Hilsenhoff Biotic Index (HBI): 4.62   *# Scrapers:* 1

% Sensitive EPT: 14.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 25.0%   *Attribute 3 genera:* 1

HGMI Rating: **29.83**   **Fair**

Habitat Analysis: 146   Suboptimal   USEPA Protocol

Observations: Water temp: 15.95 C; Cond: 390 umhos; DO: 8.74 mg/L; pH: 7.59 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 120' / <1'; Substrate: cobble, gravel, sand

Canopy: mostly open; Bank Stability: poor;   Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Other: fish, filamentous algae, waterfowl, trout stocked stream, trash

Genus	Tolerance Value	Amount
Optioservus	4	22
* Cheumatopsyche	5	16
Gammarus	6	13
Stenelmis	5	9
Amnicola	4.8	7
Limnodrilus	10	6
Cricotopus	7	5
Ferrissia	7	4
Pleurocera	7	4
Pisidium	6.8	3
Cura	4	2
Enallagma	9	2
Stylodrilus	10	2
Dugesia	4	1
Gyraulus	6	1
Prostoma	7	1
Rheumatobates	8	1
Tubifex	10	1

(EPT organism)   *Taxa Richness:* 18   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.77   *# Scrapers:* 5

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 66.7%   *Attribute 3 genera:* 0

HGMI Rating: **22.42**   **Fair**

Habitat Analysis: 138   Suboptimal   USEPA Protocol

Observations: Water temp: 9.41 C; Cond: 423 umhos; DO: 11.46 mg/L; pH: 7.47 SU

Clarity: clear; Flow Rate: fast;   Width/Depth: >100' / < 1 -2'; Substrate: gravel, sand, root mats

Canopy: open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, weeds, vines

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers

Other: fish, clams, periphytes, filamentous algae, trash; adj to pumping station

AMNET Site # **AN0269**   **Stream Name:** **Dam Bk Trib to Pompton River**

Location: **Ryerson Rd; Lincoln Park Boro; Morris County**

Collection Date: *10/23/2008*   **USGS Topo Map:** **Pompton Plains**

	Genus	Tolerance Value	Amount
	Gammarus	6	32
	Amnicola	4.8	22
	Sphaerium	8	19
	Caecidotea	8	10
*	Cheumatopsyche	5	7
	Corbicula	4	4
*	Hydropsyche	4	2
	Hemerodromia	6	1
	Micropsectra	7	1
	Paratanytarsus	6	1
	Tipula	4	1

(EPT organism)   *Taxa Richness:* 11   *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.12   *# Scrapers:* 1

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 45.5%   *Attribute 3 genera:* 1

HGMI Rating: **16.36**   **Poor**

Habitat Analysis: 97   Marginal   USEPA Protocol

Observations: Water temp: 7.88 C; Cond: 462 umhos; DO: 7.18 mg/L; pH: 6.87 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 17' / < 1.0'; Substrate: gravel, sand, silt, snags, root mats

Canopy: closed; Bank Stability: poor;   Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Other: fish, trash

	Genus	Tolerance Value	Amount
*	Cheumatopsyche	5	36
	Rheotanytarsus	6	30
	Hemerodromia	6	12
	Polypedilum	6	4
	Stenelmis	5	4
	Microtendipes	7	3
	Nais	8	3
	Chironomus	10	1
	Coenagrionidae	9	1
	Cricotopus	7	1
	Dicrotendipes	8	1
*	Hydropsyche	4	1
	Physella	9.1	1
	Simulium	6	1
	Thienemannimyia	6	1

* (EPT organism)   *Taxa Richness:* 15   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.80   *# Scrapers:* 2

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 13.3%   *Attribute 3 genera:* 0

HGMI Rating: **27.82**   **Fair**

Habitat Analysis: 124   Suboptimal   USEPA Protocol

Observations: Water temp: 11.63 C; Cond: 424 umhos; DO: 11.60 mg/L; pH: 8.53 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 10' / < 1.0'; Substrate: bedrock, cobble, root mats

Canopy: partly open; Bank Stability: fair;   Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban, park/country club

Downstream of Impoundment: Packanack lake

Other: fish, periphytes, trash; RB channelized

AMNET Site # **AN0271**   *Stream Name:* **Deepavaal Bk**

Location: **Little Falls Ave & Jane Rd; Caldwell Twp; Essex County**

Collection Date: *11/12/2008*   *USGS Topo Map:* **Pompton Plains**

Genus	Tolerance Value	Amount
Gammarus	6	83
Caecidotea	8	4
Enallagma	9	4
Lirceus	8	3
Helobdella	8	2
Amnicola	4.8	1
Limnodrilus	10	1
Menetus	6	1
Pisidium	6.8	1

(EPT organism)   *Taxa Richness:* 9   *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.34   *# Scrapers:* 2

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 88.9%   *Attribute 3 genera:* 0

HGMI Rating: **9.94**   **Poor**

Habitat Analysis: 83   Marginal   USEPA Protocol

Observations: Water temp: 8.26 C; Cond: 726 umhos; DO: 6.90 mg/L; pH: 7.18 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 22' / 2'; Substrate: mud, silt

Canopy: mostly open; Bank Stability: fair;   Bank Vegetation: trees, grasses

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Pipes / Ditches: storm sewers

AMNET Site # AN0272   **Stream Name:** **Preakness Bk (Singac Bk)**

Location: **Rt 504 (Pat Ham Tpk); Wayne Twp; Passaic County**

Collection Date: *10/9/2008*   **USGS Topo Map:** **Paterson**

	Genus	Tolerance Value	Amount
	Gammarus	6	16
*	Cheumatopsyche	5	15
	Simulium	6	11
	Cricotopus	7	10
	Dugesia	4	6
	Rheotanytarsus	6	6
*	Chimarra	4	4
	Cura	4	4
*	Baetis	6	3
	Ischnura	9	3
	Stenelmis	5	3
	Stylodrilus	10	3
*	Hydropsyche	4	2
	Polypedilum	6	2
	Prostoma	7	2
	Tipula	4	2
*	Ceratopsyche	4	1
	Cladotanytarsus	7	1
*	Maccaffertium	3	1
	Microtendipes	7	1
	Orthocladius	6	1
	Psectrocladius	8	1
	Tanytarsus	6	1
	Tribelos	5	1

(EPT organism)   **Taxa Richness:** 24   **Population:** 100

Hilsenhoff Biotic Index (HBI):	5.77	*# Scrapers:*	2
% Sensitive EPT:	8.0%	*Attribute 2 genera:*	0
% Non-Insect Taxa:	20.8%	*Attribute 3 genera:*	3

HGMI Rating: **34.75**   **Fair**

Habitat Analysis: 120   Suboptimal   USEPA Protocol

Observations: Water temp: 14.87 C; Cond: 647 umhos; DO: 9.94 mg/L; pH: 7.57 SU

   Clarity: clear; Flow Rate: moderate;   Width/Depth: 16'/1-4'; Substrate: cobble, gravel, sand

   Canopy: open; Bank Stability: fair;   Bank Vegetation: trees, shrubs, lawn

   Stream Gradient: High Gradient Stream;   Land Uses: commercial

   Pipes / Ditches: storm sewers

   Other: shopping center, macrophytes, filamentous algae, fish

AMNET Site # **AN0273**   **Stream Name:** **Preakness Bk**

Location: **Edison Dr; Wayne Twp; Passaic County**

Collection Date: *10/29/2008*   **USGS Topo Map:** **Paterson**

	Genus	Tolerance Value	Amount
	Gammarus	6	34
	Microtendipes	7	21
*	Cheumatopsyche	5	8
	Antocha	3	6
*	Ceratopsyche	4	4
	Cricotopus	7	3
	Limnodrilus	10	3
	Stenelmis	5	3
	Stictochironomus	9	3
*	Hydropsyche	4	2
	Caecidotea	8	1
	Calopteryx	6	1
	Chironomus	10	1
	Dicrotendipes	8	1
	Enallagma	9	1
	Gloiobdella	6	1
	Hemerodromia	6	1
	Nais	8	1
	Rheotanytarsus	6	1
	Tipula	4	1

(EPT organism)   *Taxa Richness:* 20   *Population:* 97

Hilsenhoff Biotic Index (HBI): 6.15   *# Scrapers:* 1

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 25.0%   *Attribute 3 genera:* 1

HGMI Rating: **25.30**   **Fair**

Habitat Analysis: 125   Suboptimal   USEPA Protocol

Observations: Water temp: 8.11 C; Cond: 391 umhos; DO: 10.46 mg/L; pH: 7.31 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 24' / 1 - 2';   Substrate: cobble, sand, silt

Canopy: mostly open; Bank Stability: fair;   Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: industrial

Pipes / Ditches: storm sewers

Other: sewage-like odor

AMNET Site # **AN0274**   *Stream Name:* **Passaic River**

Location: **River View Dr; Totowa Boro; Passaic County**

Collection Date: *10/23/2008*   *USGS Topo Map:* **Paterson**

	Genus	Tolerance Value	Amount
	Gammarus	6	59
*	Cheumatopsyche	5	12
	Cricotopus	7	6
	Corbicula	4	5
*	Stenacron	4	4
	Ferrissia	7	3
	Simulium	6	3
*	Acentrella	4	2
	Elimia	2	2
*	Hydroptila	6	2
	Glyptotendipes	10	1
	Musculium	5	1

* (EPT organism)   *Taxa Richness:* 12   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.70   *# Scrapers:* 4

% Sensitive EPT: 8.0%   *Attribute 2 genera:* 1

% Non-Insect Taxa: 41.7%   *Attribute 3 genera:* 0

HGMI Rating: **27.45**   **Fair**

Habitat Analysis: 146   Suboptimal   USEPA Protocol

Observations: Water temp: 10.35 C; Cond: 825 umhos; DO: 11.07 mg/L; pH: 7.85 SU

Clarity: clear; Flow Rate: fast; Width/Depth: 260' / <1 - 2'; Substrate: cobbles, gravel, sand, root mats

Canopy: open; Bank Stability: fair;   Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: forested, industrial

Other: fish, periphytes, filamentous algae; trash

AMNET Site # **AN0274A**   **Stream Name:** **Passaic River**

Location: **end of Willard Lane; Montville Twp; Morris & Essex County**

Collection Date: *10/20/2008*   **USGS Topo Map:** **Pompton Plains**

	Genus	Tolerance Value	Amount
*	Cheumatopsyche	5	24
	Corixidae	9	20
	Gammarus	6	16
	Rheotanytarsus	6	13
*	Hydroptila	6	8
	Polypedilum	6	6
	Corbicula	4	3
	Macronychus	2	2
	Alboglossiphonia	8	1
	Cricotopus	7	1
	Cryptochironomus	8	1
	Dicrotendipes	8	1
	Dubiraphia	6	1
	Ischnura	9	1
	Pisidium	6.8	1
	Planorbidae	6	1

(EPT organism)   **Taxa Richness:** 16   **Population:** 100

Hilsenhoff Biotic Index (HBI): 6.33   **# Scrapers:** 4

% Sensitive EPT: 8.0%   **Attribute 2 genera:** 0

% Non-Insect Taxa: 31.3%   **Attribute 3 genera:** 0

HGMI Rating: **27.61**   **Fair**

Habitat Analysis: 104   Marginal   USEPA Protocol

Observations: Water temp: 11.45 C; Cond: 895 umhos; DO: 9.60 mg/L; pH: 7.60 SU

Clarity: slightly turbid; Flow Rate: slow;   Width/Depth: 75' / 2 - 4'; Substrate: cobble, gravel, sand, silt, snags

Canopy: open; Bank Stability: poor; Bank Vegetation: trees, grasses, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Pipes / Ditches: storm sewers

Other: fish, crayfish, clams, macrophytes, trash

AMNET Site # **AN0275**   **Stream Name:** **Peckman River**

Location: **McBride Ave; West Paterson Boro; Passaic County**

Collection Date: *10/23/2008*   **USGS Topo Map:** **Paterson**

	Genus	Tolerance Value	Amount
	Gammarus	6	20
	Caecidotea	8	15
	Dicrotendipes	8	13
*	Cheumatopsyche	5	10
	Simulium	6	9
	Cricotopus	7	5
	Tanytarsus	6	5
*	Hydropsyche	4	3
*	Acerpenna	4	2
	Cura	4	2
*	Ceratopsyche	4	1
	Chironomus	10	1
	Dugesia	4	1
	Enallagma	9	1
	Helobdella	8	1
*	Hydroptila	6	1
	Microtendipes	7	1
	Paratanytarsus	6	1

(EPT organism)   **Taxa Richness:** 18   **Population:** 92

Hilsenhoff Biotic Index (HBI): 6.47   **# Scrapers:** 1

% Sensitive EPT: 3.3%   **Attribute 2 genera:** 1

% Non-Insect Taxa: 27.8%   **Attribute 3 genera:** 0

HGMI Rating: **23.52**   **Fair**

Habitat Analysis: 112   Suboptimal   USEPA Protocol

Observations: Water temp: 6.17 C; Cond: 889 umhos; DO: 13.32 mg/L; pH: 7.79 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 35' / 1 - 3'; Substrate: cobble, gravel, sand, root mats, undercut banks

Canopy: partly open; Bank Stability: poor;   Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: commercial, suburban

Pipes / Ditches: storm sewers

Other: fish, waterfowl, trash

Genus	Tolerance Value	Amount
* Cheumatopsyche	5	29
* Hydropsyche	4	16
* Ceratopsyche	4	9
Dugesia	4	8
* Leucotrichia	3	7
Parametriocnemus	5	6
* Hydroptila	6	4
Dicrotendipes	8	3
Lumbriculidae	8	3
Prostoma	7	3
Paratanytarsus	6	2
Antocha	3	1
Cricotopus	7	1
Gammarus	6	1
Hymanella	4	1
Micropsectra	7	1
Microtendipes	7	1
Pisidium	6.8	1
Rheotanytarsus	6	1
Stenelmis	5	1
Tvetenia	5	1

(EPT organism)   **Taxa Richness:** 21   *Population:* 100

Hilsenhoff Biotic Index (HBI): 4.90   *# Scrapers:* 3

% Sensitive EPT: 11.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 28.6%   *Attribute 3 genera:* 1

HGMI Rating: **33.23** **Fair**

Habitat Analysis: 132 Suboptimal USEPA Protocol

Observations: Water temp: 10.55 C; Cond: 633 umhos; DO: 11.59 mg/L; pH: 7.71 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 30' / < 1'; Substrate: cobble, gravel, sand, silt

Canopy: open; Bank Stability: fair; Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream; Land Uses: suburban, adj to ballpark and County Road Dept

Pipes / Ditches: storm sewers

Other: periphytes, filamentous algae

AMNET Site # **AN0276**   **Stream Name:** **Molly Ann Bk**

Location: **off Totowa Ave Bridge; Prospect Park Boro; Passaic County**

Collection Date: *10/29/2008*   **USGS Topo Map:** **Paterson**

Genus	Tolerance Value	Amount
Gammarus	6	40
Limnodrilus	10	11
Tanytarsus	6	8
Caecidotea	8	6
Planorbidae	6	6
Pisidium	6.8	4
Crangonyx	8	3
Dugesia	4	3
Polypedilum	6	3
Dicrotendipes	8	2
Physella	9.1	2
Stylaria	8	2
Tubifex	10	2
Atrichopogon	2	1
* Callibaetis	9	1
Chironomus	10	1
Hydrolimax	4	1
Ischnura	9	1
Microvelia	6	1
Orthocladiinae	5	1
Prostoma	7	1

(EPT organism)   **Taxa Richness:** 21 **Population:** 100

Hilsenhoff Biotic Index (HBI): 6.85   **# Scrapers:** 2

% Sensitive EPT: 1.0%   **Attribute 2 genera:** 0

% Non-Insect Taxa: 57.1%   **Attribute 3 genera:** 1

HGMI Rating: **16.77**   **Poor**

Habitat Analysis: 129   Suboptimal   USEPA Protocol

Observations: Water temp: 8.47 C; Cond: 444 umhos; DO: 9.75 mg/L; pH: 7.51 SU

Clarity: turbid; Flow Rate: slow; Width/Depth: 44' / 3 - 4'; Substrate: cobble

Canopy: open; Bank Stability: good;   Bank Vegetation: trees, weeds, lawn

Stream Gradient: High Gradient Stream;   Land Uses: urban, community park

Other: flooded banks from recent storm

AMNET Site # **AN0277**   **Stream Name:** **Goffle Bk**

Location: **Wagaraw Rd; Hawthorne Boro; Passaic County**

Collection Date: *10/29/2008*   **USGS Topo Map:** **Paterson**

	Genus	Tolerance Value	Amount
*	Cheumatopsyche	5	34
	Caecidotea	8	12
	Rheotanytarsus	6	8
*	Hydropsyche	4	7
	Hemerodromia	6	6
	Polypedilum	6	5
	Simulium	6	4
	Lumbriculidae	8	3
	Crangonyx	8	2
	Cricotopus	7	2
	Erpobdellidae	8	2
	Parametriocnemus	5	2
	Planariidae	4	2
	Prostoma	7	2
	Stenelmis	5	2
	Tvetenia	5	2
	Antocha	3	1
	Dicrotendipes	8	1
	Micropsectra	7	1
	Nais	8	1
	Rheocricotopus	6	1

(EPT organism)   **Taxa Richness:** 21   **Population:** 100

Hilsenhoff Biotic Index (HBI): 5.86   *# Scrapers:* 1

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 33.3%   *Attribute 3 genera:* 1

HGMI Rating: **24.55**   **Fair**

Habitat Analysis: 128   Suboptimal   USEPA Protocol

Observations: Water temp: 8.18 C; Cond: 363 umhos; DO: 10.62 mg/L; pH: 7.57 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 20' / < 1.0 '; Substrate: cobble, gravel, sand

Canopy: mostly open; Bank Stability: poor; Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: urban

Pipes / Ditches: storm sewers

Other: trash; upstream of site flows under a building

	Genus	*Tolerance Value*	*Amount*
*	Cheumatopsyche	5	39
	Gammarus	6	12
	Stenelmis	5	8
	Polypedilum	6	7
	Tanytarsus	6	5
*	Hydropsyche	4	4
	Parametriocnemus	5	4
	Antocha	3	3
	Cricotopus	7	2
	Hemerodromia	6	2
	Nais	8	2
	Simulium	6	2
	Alboglossiphonia	8	1
*	Chimarra	4	1
	Dugesia	4	1
	Eclipidrilus	8	1
	Helobdella	8	1
	Limnodrilus	10	1
	Paratanytarsus	6	1
	Pristinella	10	1
	Rheotanytarsus	6	1
	Tipula	4	1

* (EPT organism)   *Taxa Richness:* 22   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.46   *# Scrapers:* 1

% Sensitive EPT: 1.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 36.4%   *Attribute 3 genera:* 2

HGMI Rating: **26.97**   **Fair**

Habitat Analysis: 118   Suboptimal   USEPA Protocol

Observations: Water temp: 6.41 C; Cond: 432 umhos; DO: 12.28 mg/L; pH: 7.69 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 20' / 1'; Substrate: cobble, gravel, sand

Canopy: partly open; Bank Stability: poor;   Bank Vegetation: trees, weeds, vines

Stream Gradient: High Gradient Stream;   Land Uses: urban

Pipes / Ditches: storm sewers

AMNET Site # **AN0278**   **Stream Name:** **Diamond Bk**

Location: **Harristown Rd.; Fair Lawn Boro; Bergen County**

Collection Date: *11/12/2008*   **USGS Topo Map:** **Paterson**

	Genus	Tolerance Value	Amount
	Lumbriculus	8	43
	Gammarus	6	15
	Parametriocnemus	5	11
	Cricotopus	7	4
	Micropsectra	7	4
	Simulium	6	4
*	Cheumatopsyche	5	3
	Mooreobdella	7.8	2
	Rheotanytarsus	6	2
	Tvetenia	5	2
	Dugesia	4	1
*	Hydropsyche	4	1
	Lirceus	8	1
	Menetus	6	1
	Nais	8	1
	Paratanytarsus	6	1
	Phaenopsectra	7	1
	Pisidium	6.8	1
	Polypedilum	6	1
	Tanytarsus	6	1

* (EPT organism)   *Taxa Richness:* 20   *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.83   *# Scrapers:* 2

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 40.0%   *Attribute 3 genera:* 1

HGMI Rating: **20.01** **Poor**

Habitat Analysis: 103   Marginal   USEPA Protocol

Observations: Water temp: 9.80 C; Cond: 702 umhos; DO: 10.06 mg/L; pH: 7.44 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 28' / < 1'; Substrate: cobble, gravel, sand, silt

Canopy: mostly open; Bank Stability: good;   Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Pipes / Ditches: storm sewers

AMNET Site # **AN0279**   **Stream Name:** **Saddle R**

Location: **Old Stone Church Rd; Upper Saddle River Boro; Bergen County**

Collection Date: *11/13/2008*   **USGS Topo Map:** **Park Ridge**

	Genus	Tolerance Value	Amount
*	Ceratopsyche	4	24
*	Glossosoma	0	13
*	Cheumatopsyche	5	8
*	Chimarra	4	7
*	Hydropsyche	4	6
	Lumbriculus	8	6
	Tvetenia	5	5
	Orthocladius	6	4
	Planariidae	4	4
	Antocha	3	3
	Cricotopus	7	3
	Diamesa	5	2
	Micropsectra	7	2
	Rheotanytarsus	6	2
	Slavina	7	2
	Stenelmis	5	2
	Hydrobaenus	8	1
*	Hydroptila	6	1
	Microtendipes	7	1
	Orthocladiinae	5	1
	Parametriocnemus	5	1
	Polypedilum	6	1
	Simulium	6	1

* (EPT organism)   **Taxa Richness:** 23 **Population:** 100

Hilsenhoff Biotic Index (HBI): 4.34   **# Scrapers:** 4

% Sensitive EPT: 21.0%   **Attribute 2 genera:** 2

% Non-Insect Taxa: 13.0%   **Attribute 3 genera:** 1

HGMI Rating: **47.04** **Good**

Habitat Analysis: 140 Suboptimal USEPA Protocol

Observations: Water temp: 9.02 C; Cond: 628 umhos; DO: 11.09 mg/L; pH: 7.69 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 50' / < 1'; Substrate: cobble, gravel, sand, undercut banks

Canopy: mostly open; Bank Stability: poor; Bank Vegetation: trees, shrubs, weeds

Stream Gradient: High Gradient Stream; Land Uses: suburban

Pipes / Ditches: storm sewers

Downstream of Impoundment: small pond

Other: fish, filamentous algae; oil sheen

	Genus	Tolerance Value	Amount
*	Hydropsyche	4	19
*	Cheumatopsyche	5	18
*	Chimarra	4	15
	Cura	4	9
	Cricotopus	7	6
	Stenelmis	5	5
*	Glossosoma	0	4
	Eclipidrilus	8	3
	Orthocladius	6	3
	Simulium	6	3
	Diamesa	5	2
*	Baetis	6	1
*	Ceratopsyche	4	1
	Enchytraeidae	10	1
	Gammarus	6	1
	Haliplus	5	1
	Heterotrissocladius	0	1
	Microtendipes	7	1
	Parametriocnemus	5	1
	Rheotanytarsus	6	1
	Tanytarsus	6	1
	Tipula	4	1

AMNET Site # **AN0280**   Stream Name: **W Br Saddle River**

Location: **Old Stone Church Rd; Upper Saddle River Boro; Bergen County**

Collection Date: *11/13/2008*   USGS Topo Map: **Park Ridge**

(EPT organism)   Taxa Richness: 22   Population: 98

Hilsenhoff Biotic Index (HBI): 4.67   # Scrapers: 2

% Sensitive EPT: 20.4%   Attribute 2 genera: 2

% Non-Insect Taxa: 18.2%   Attribute 3 genera: 3

HGMI Rating: **44.65**   **Good**

Habitat Analysis: 118   Suboptimal   USEPA Protocol

Observations: Water temp: 8.71 C; Cond: 621 umhos; DO: 13.21 mg/L; pH: 7.78 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 14' / < 1'; Substrate: cobble, gravel, sand, undercut banks

Canopy: partly open; Bank Stability: poor;   Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Pipes / Ditches: storm sewers

Other: fish, crayfish, periphytes, filamentous algae

AMNET Site # **AN0281**   **Stream Name:** **Saddle R**

Location: **E Allendale Ave; Saddle River Boro; Bergen County**

Collection Date: *10/30/2008*   **USGS Topo Map:** **Park Ridge**

Genus	Tolerance Value	Amount
Gammarus	6	22
Enallagma	9	16
Lirceus	8	9
Crangonyx	8	5
Stenelmis	5	5
Microtendipes	7	4
Calopteryx	6	3
Cricotopus	7	3
Eclipidrilus	8	3
Promenetus	6	3
Rheotanytarsus	6	3
Dicrotendipes	8	2
Gyraulus	6	2
Musculium	5	2
Physella	9.1	2
Trichocorixa	9	2
Amnicola	4.8	1
Cura	4	1
Dubiraphia	6	1
Dugesia	4	1
Glossiphoniidae	8	1
Limnodrilus	10	1
Limnophora	7	1
Menetus	6	1
* Mystacides	4	1
Peltodytes	5	1
Prostoma	7	1
Stictochironomus	9	1
Stylogomphus	1	1
Tipula	4	1

(EPT organism)   **Taxa Richness:** 30   **Population:** 100

Hilsenhoff Biotic Index (HBI): 6.94   **# Scrapers:** 7

% Sensitive EPT: 1.0%   **Attribute 2 genera:** 0

% Non-Insect Taxa: 50.0%   **Attribute 3 genera:** 2

HGMI Rating: **31.19**   **Fair**

Habitat Analysis: 96   Marginal   USEPA Protocol

Observations: Water temp: 8.07 C; Cond: 461 umhos; DO: 10.99 mg/L; pH: 7.67 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 22' / 1 - 3'; Substrate: cobble, sand, gravel, root mats

Canopy: mostly open; Bank Stability: poor;   Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: suburban, commercial (adj to plant nursery)

Pipes / Ditches: storm sewers

Other: fish, periphytes

AMNET Site # **AN0282**   **Stream Name:** **Saddle R**

Location: **E Ridgewood Ave; Ridgewood Village; Bergen County**

Collection Date: *11/12/2008*   **USGS Topo Map:** **Hackensack**

Genus	Tolerance Value	Amount
* Ceratopsyche	4	25
* Hydropsyche	4	19
Cura	4	11
Gammarus	6	7
* Cheumatopsyche	5	6
Lirceus	8	6
Cricotopus	7	3
Musculium	5	3
Lumbriculus	8	2
Paratanytarsus	6	2
Pisidium	6.8	2
Simulium	6	2
Brillia	5	1
* Chimarra	4	1
Dicrotendipes	8	1
* Glossosoma	0	1
Rheotanytarsus	6	1
* Stenacron	4	1
Synorthocladius	2	1

(EPT organism)   *Taxa Richness:* 19   *Population:* 95

Hilsenhoff Biotic Index (HBI): 4.83   *# Scrapers:* 2

% Sensitive EPT: 3.2%   *Attribute 2 genera:* 1

% Non-Insect Taxa: 31.6%   *Attribute 3 genera:* 0

HGMI Rating: **29.89**   **Fair**

Habitat Analysis: 145   Suboptimal   USEPA Protocol

Observations: Water temp: 6.91 C; Cond: 624 umhos; DO: 11.83 mg/L; pH: 7.86 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 52' / 1'; Substrate: cobble, gravel, sand

Canopy: mostly open; Bank Stability: good; Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: suburban, forested

Pipes / Ditches: storm sewers

	Genus	Tolerance Value	Amount
*	Cheumatopsyche	5	29
*	Hydropsyche	4	19
*	Chimarra	4	13
	Cura	4	10
	Gammarus	6	4
	Helisoma	7	4
	Caecidotea	8	3
	Physella	9.1	3
	Simulium	6	3
	Hyalella	8	2
	Pisidium	6.8	2
	Stenelmis	5	2
	Hetaerina	6	1
	Nais	8	1
	Polypedilum	6	1
	Prostoma	7	1
	Rheotanytarsus	6	1
	Thienemannimyia	6	1

(EPT organism)   *Taxa Richness:* 18   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.13   *# Scrapers:* 3

% Sensitive EPT: 13.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 50.0%   *Attribute 3 genera:* 0

HGMI Rating: **23.27**   **Fair**

Habitat Analysis: 154   Suboptimal   USEPA Protocol

Observations: Water temp: 4.40 C; Cond: 465 umhos; DO: 11.57 mg/L; pH: 7.27 SU

Clarity: clear, cedar brown; Flow Rate: moderate;   Width/Depth: 12' / < 1'; Substrate: cobble, gravel, root mats

Canopy: mostly open; Bank Stability: good;   Bank Vegetation: trees, shrubs, lawn

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Pipes / Ditches: storm sewers

Downstream of Impoundment: De Yoe Pond

Other: fish, crayfish, salamander, periphytes

Genus	Tolerance Value	Amount
* Cheumatopsyche	5	16
Gammarus	6	15
Micropsectra	7	10
Planariidae	4	8
Crangonyx	8	4
Pisidium	6.8	4
Simulium	6	4
Stictochironomus	9	4
* Ceratopsyche	4	3
Microtendipes	7	3
Stenelmis	5	3
Caecidotea	8	2
Diamesa	5	2
* Hydropsyche	4	2
Lumbricidae	10	2
Paratanytarsus	6	2
Planorbidae	6	2
Tanytarsus	6	2
* Baetis	6	1
Calopteryx	6	1
* Chimarra	4	1
Cricotopus	7	1
Diplocladius	8	1
Limnodrilus	10	1
Limnophyes	8	1
Microvelia	6	1
Phaenopsectra	7	1
Polypedilum	6	1
Thienemanniella	6	1
Thienemannimyia	6	1

(EPT organism)   **Taxa Richness:** 30   **Population:** 100

Hilsenhoff Biotic Index (HBI):   6.09   **# Scrapers:** 3

% Sensitive EPT: 2.0%   **Attribute 2 genera:** 1

% Non-Insect Taxa: 26.7%   **Attribute 3 genera:** 2

HGMI Rating: **35.48**   **Fair**

Habitat Analysis: 130   Suboptimal   USEPA Protocol

Observations: Water temp: 7.49 C; Cond: 839 umhos;   DO: 10.44 mg/L; pH: 7.35 SU

Clarity: clear; Flow Rate: slow;   Width/Depth: 18' / < 1.0 - 1'; Substrate: cobble, gravel, sand, root mats, undercut banks

Canopy: partly open; Bank Stability: poor;   Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Pipes / Ditches: storm sewers

Other: periphytes, waterfowl

AMNET Site # **AN0285**   *Stream Name:* **Hohokus Bk**

Location: **Park Ave; Allendale Boro; Bergen County**

Collection Date: *10/30/2008*   *USGS Topo Map:* **Ramsey**

	Genus	Tolerance Value	Amount
*	Chimarra	4	45
	Cura	4	18
*	Cheumatopsyche	5	13
*	Hydropsyche	4	7
	Microtendipes	7	5
*	Ceratopsyche	4	4
	Antocha	3	3
	Gammarus	6	2
	Rheotanytarsus	6	1
	Simulium	6	1
	Stenelmis	5	1

* (EPT organism)   *Taxa Richness:* 11   *Population:*   100

Hilsenhoff Biotic Index (HBI):   4.34   *# Scrapers:*   1

% Sensitive EPT: 45.0%   *Attribute 2 genera:*   0

% Non-Insect Taxa: 18.2%   *Attribute 3 genera:*   0

HGMI Rating: **36.21**   **Fair**

Habitat Analysis: 148   Suboptimal   USEPA Protocol

Observations: Water temp: 6.76 C; Cond: 623 umhos; DO: 13.11 mg/L; pH: 8.14 SU

Clarity: clear; Flow Rate: fast;   Width/Depth: 17' / 1'; Substrate: cobble, gravel, sand

Canopy: mostly closed; Bank Stability: fair;   Bank Vegetation: trees

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Other: crayfish, periphytes

AMNET Site # **AN0286** **Stream Name:** **Ramsey Bk**

Location: **Masonicus Rd; Mahwah Twp; Bergen County**

Collection Date: *11/13/2008* **USGS Topo Map:** **Park Ridge**

	Genus	Tolerance Value	Amount
	Diplocladius	8	31
	Tanytarsus	6	17
	Parametriocnemus	5	9
	Nais	8	5
*	Cheumatopsyche	5	4
*	Chimarra	4	3
	Cura	4	3
	Pisidium	6.8	3
	Eclipidrilus	8	2
	Paratanytarsus	6	2
	Phaenopsectra	7	2
	Polypedilum	6	2
	Simulium	6	2
	Tvetenia	5	2
	Calopteryx	6	1
	Corynoneura	4	1
	Dicrotendipes	8	1
	Gammarus	6	1
	Gyraulus	6	1
*	Hydropsyche	4	1
	Orconectes	6	1
	Prostoma	7	1
	Rheocricotopus	6	1
	Rheopelopia	4	1
	Stenelmis	5	1
	Tipula	4	1
	Tubificidae	10	1

(EPT organism)   **Taxa Richness:** 27   **Population:** 100

Hilsenhoff Biotic Index (HBI): 6.51   *# Scrapers:* 3

% Sensitive EPT: 3.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 33.3%   *Attribute 3 genera:* 2

HGMI Rating: **30.67** **Fair**

Habitat Analysis: 154 Suboptimal USEPA Protocol

Observations: Water temp: 8.15 C; Cond: 552 umhos; DO: 9.16 mg/L; pH: 6.94 SU

Clarity: clear; Flow Rate: slow; Width/Depth: 8' / < 1'; Substrate: cobble, gravel, sand

Canopy: partly open; Bank Stability: fair; Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream; Land Uses: suburban

Other: fish, crayfish, salamander

AMNET Site # **AN0287**   **Stream Name:** **Ramsey Bk**

Location: **Park Ave; Allendale Boro; Bergen County**

Collection Date: *10/30/2008*   **USGS Topo Map:** **Ramsey**

	Genus	Tolerance Value	Amount
*	Cheumatopsyche	5	28
	Planariidae	4	17
	Polypedilum	6	6
	Ischnura	9	5
	Calopteryx	6	4
*	Hydropsyche	4	4
	Nais	8	4
	Rheotanytarsus	6	4
	Cricotopus	7	3
	Tipula	4	3
*	Chimarra	4	2
	Microtendipes	7	2
	Parametriocnemus	5	2
	Paratanytarsus	6	2
	Stenelmis	5	2
	Thienemannimyia	6	2
*	Ceratopsyche	4	1
	Collembola	10	1
	Corynoneura	4	1
	Crangonyx	8	1
	Curculionidae	7	1
	Enchytraeidae	10	1
	Glyptotendipes	10	1
	Microvelia	6	1
	Pisidium	6.8	1
	Prostoma	7	1

(EPT organism)   **Taxa Richness:** 26   **Population:** 100

Hilsenhoff Biotic Index (HBI):   5.57   *# Scrapers:* 1

% Sensitive EPT: 2.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 26.9%   *Attribute 3 genera:* 3

HGMI Rating: **32.53**   **Fair**

Habitat Analysis: 140   Suboptimal   USEPA Protocol

Observations: Water temp: 7.97 C; Cond: 490 umhos; DO: 11.03 mg/L; pH: 7.84 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 14' / < 1.0 - 1'; Substrate: cobble, gravel, sand, root mats, undercut banks

Canopy: mostly closed; Bank Stability: fair;   Bank Vegetation: trees

Stream Gradient: High Gradient Stream;   Land Uses: suburban

Other: fish, crayfish, periphytes

Genus	Tolerance Value	Amount
Amnicola	4.8	42
Ischnura	9	13
Gammarus	6	12
Ancyronyx	2	6
Rheotanytarsus	6	6
Paratanytarsus	6	5
Caecidotea	8	4
Dicrotendipes	8	2
Menetus	6	2
* Ceratopsyche	4	1
Crangonyx	8	1
Cricotopus	7	1
Micropsectra	7	1
Microtendipes	7	1
Prostoma	7	1
Tanytarsus	6	1
Thienemannimyia	6	1

(EPT organism)   **Taxa Richness:** 17   **Population:** 100

Hilsenhoff Biotic Index (HBI): 5.81   *# Scrapers:* 2

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 35.3%   *Attribute 3 genera:* 0

HGMI Rating: **22.38** **Fair**

Habitat Analysis: 92 Marginal USEPA Protocol

Observations: Water temp: 10.86 C; Cond: 922 umhos; DO: 10.17 mg/L; pH: 7.63 SU

Clarity: clear; Flow Rate: slow; Width/Depth: 48' / 2'; Substrate: cobble, sand, mud, silt, root mats

Canopy: mostly open; Bank Stability: fair; Bank Vegetation: trees

Stream Gradient: High Gradient Stream; Land Uses: suburban, adj to ballfield

Pipes / Ditches: storm sewers

Other: waterfowl

Genus	Tolerance Value	Amount
Lirceus	8	55
* Cheumatopsyche	5	8
Menetus	6	6
Gammarus	6	5
Rheotanytarsus	6	4
Prostoma	7	3
Cura	4	2
Dicrotendipes	8	2
Enallagma	9	2
Musculium	5	2
Paratanytarsus	6	2
Tanytarsus	6	2
Amnicola	4.8	1
Argia	6	1
Berosus	5	1
Microtendipes	7	1
Pisidium	6.8	1
Polypedilum	6	1
Stenelmis	5	1

* (EPT organism)

Taxa Richness:	19	*Population:*	100
Hilsenhoff Biotic Index (HBI):	7.08	*# Scrapers:*	3
% Sensitive EPT:	0.0%	*Attribute 2 genera:*	0
% Non-Insect Taxa:	42.1%	*Attribute 3 genera:*	0

HGMI Rating: **19.50**   **Poor**

Habitat Analysis: 110   Suboptimal   USEPA Protocol

Observations: Water temp: 9.64 C; Cond: 840 umhos; DO: 9.33 mg/L; pH: 7.42 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 39' / 2'; Substrate: cobble, gravel, sand, silt

Canopy: mostly open; Bank Stability: fair;   Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: suburban

AMNET Site # **AN0290**   **Stream Name:** **Saddle R**

Location: **Railroad Ave; Rochelle Park Twp; Bergen County**

Collection Date: *11/20/2008*   **USGS Topo Map:** **Hackensack**

	Genus	Tolerance Value	Amount
	Corbicula	4	20
	Limnodrilus	10	19
	Gammarus	6	16
*	Cheumatopsyche	5	9
	Rheotanytarsus	6	5
	Cricotopus	7	4
*	Hydroptila	6	3
	Phaenopsectra	7	3
	Polypedilum	6	3
	Chironomus	10	2
	Hydrolimax	4	2
	Paratanytarsus	6	2
	Pisidium	6.8	2
	Ancyronyx	2	1
*	Ceratopsyche	4	1
	Dicrotendipes	8	1
	Lirceus	8	1
	Microtendipes	7	1
	Nais	8	1
	Physella	9.1	1
	Prostoma	7	1
	Stagnicola	7	1
	Stictochironomus	9	1

(EPT organism)   **Taxa Richness:** 23   **Population:** 100

Hilsenhoff Biotic Index (HBI):   6.49   **# Scrapers:** 4

% Sensitive EPT: 3.0%   **Attribute 2 genera:** 0

% Non-Insect Taxa: 43.5%   **Attribute 3 genera:** 0

HGMI Rating: **24.87**   **Fair**

Habitat Analysis: 110   Suboptimal   USEPA Protocol

Observations: Water temp: 6.07 C; Cond: 835 umhos; DO: 10.14 mg/L; pH: 7.49 SU

Clarity: clear; Flow Rate: moderate;   Width/Depth: 100' / 1'; Substrate: sand, silt, snags

Canopy: open; Bank Stability: poor; Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: urban, community park

Pipes / Ditches: storm sewers

Other: clams, waterfowl; oil sheen

Genus	Tolerance Value	Amount
Rheotanytarsus	6	45
* Cheumatopsyche	5	19
Cricotopus	7	7
Paratanytarsus	6	4
Polypedilum	6	4
Tanytarsus	6	3
Gammarus	6	2
Lirceus	8	2
Musculium	5	2
Simulium	6	2
Dicrotendipes	8	1
Eukiefferiella	8	1
Hemerodromia	6	1
* Hydropsyche	4	1
* Hydroptila	6	1
Nais	8	1
Prostoma	7	1
Rheocricotopus	6	1
Sympotthastia	2	1
Tvetenia	5	1

* (EPT organism)   *Taxa Richness:* 20   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.90   *# Scrapers:* 1

% Sensitive EPT: 1.0%   *Attribute 2 genera:* 1

% Non-Insect Taxa: 25.0%   *Attribute 3 genera:* 0

HGMI Rating: **29.26**   **Fair**

Habitat Analysis: 129   Suboptimal   USEPA Protocol

Observations: Water temp: 6.15 C; Cond: 810 umhos; DO: 11.36 mg/L; pH: 7.95 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 75' / 1'; Substrate: cobble, gravel, sand, snags

Canopy: mostly open; Bank Stability: poor; Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream; Land Uses: urban

Pipes / Ditches: storm sewers

Other: fish, clams, macrophytes, periphytes; trash

AMNET Site # **AN0292**   **Stream Name:** **Third River**

Location: **Kingland Rd; Clifton; Passaic County**

Collection Date: *11/18/2008*   **USGS Topo Map:** **Orange**

Genus	Tolerance Value	Amount
Gammarus	6	43
* Cheumatopsyche	5	22
* Ceratopsyche	4	6
Stenelmis	5	5
Dugesia	4	3
* Hydropsyche	4	3
Prostoma	7	3
Elimia	2	2
Ferrissia	7	2
Musculium	5	2
Antocha	3	1
Brillia	5	1
Caecidotea	8	1
Cricotopus	7	1
Hemerodromia	6	1
* Leucotrichia	3	1
Microtendipes	7	1
Paratanytarsus	6	1
Pisidium	6.8	1

(EPT organism)   *Taxa Richness:* 19   *Population:* 100

Hilsenhoff Biotic Index (HBI): 5.42   *# Scrapers:* 4

% Sensitive EPT: 1.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 42.1%   *Attribute 3 genera:* 0

HGMI Rating: **25.28** **Fair**

Habitat Analysis: 126   Suboptimal   USEPA Protocol

Observations: Water temp: 7.11 C; Cond: 576 umhos; DO: 11.70 mg/L; pH: 7.77 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 36' / < 1'; Substrate: cobble, gravel, sand

Canopy: partly open; Bank Stability: fair; Bank Vegetation: trees, grasses

Stream Gradient: High Gradient Stream; Land Uses: suburban

Pipes / Ditches: storm sewers

Downstream of Impoundment: Yantacaw Pond

Other: fish

Genus	Tolerance Value	Amount
Gammarus	6	25
Tanytarsus	6	17
Pisidium	6.8	15
Cura	4	8
Parametriocnemus	5	6
Cricotopus	7	4
Gyraulus	6	4
Prostoma	7	3
Antocha	3	2
* Cheumatopsyche	5	2
Eclipidrilus	8	2
Limnodrilus	10	2
Microtendipes	7	2
Rheotanytarsus	6	2
Stylodrilus	10	2
Dicrotendipes	8	1
* Hydropsyche	4	1
Simulium	6	1
Tvetenia	5	1

* (EPT organism)   *Taxa Richness:* 19   *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.10   *# Scrapers:* 1

% Sensitive EPT: 0.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 42.1%   *Attribute 3 genera:* 1

HGMI Rating: **20.25**   **Poor**

Habitat Analysis: 101   Marginal   USEPA Protocol

Observations: Water temp: 7.71 C; Cond: 689 umhos; DO: 11.55 mg/L; pH: 7.80 SU

Clarity: clear; Flow Rate: moderate; Width/Depth: 39' / < 1'; Substrate: gravel, sand

Canopy: mostly open; Bank Stability: fair; Bank Vegetation: trees, shrubs

Stream Gradient: High Gradient Stream;   Land Uses: urban, adj to GS Parkway

Pipes / Ditches: storm sewers

Other: fish

AMNET Site # **AN0292O**   **Stream Name:** **Passaic River**

Location: **off River Rd; Garfield; Bergen & Passaic County**

Collection Date: *11/20/2008*   **USGS Topo Map:** **Paterson**

	Genus	Tolerance Value	Amount
	Gammarus	6	25
	Prostoma	7	14
*	Cheumatopsyche	5	11
	Stagnicola	7	11
	Stenelmis	5	8
	Cricotopus	7	7
	Dugesia	4	5
	Musculium	5	3
	Enchytraeidae	10	2
*	Hydroptila	6	2
	Physella	9.1	2
	Pisidium	6.8	2
	Cardiocladius	5	1
	Corbicula	4	1
	Ferrissia	7	1
	Limnodrilus	10	1
	Menetus	6	1
	Orthocladius	6	1
*	Taeniopteryx	2	1
	Tipula	4	1

* (EPT organism)   *Taxa Richness:* 20   *Population:* 100

Hilsenhoff Biotic Index (HBI): 6.12   *# Scrapers:* 6

% Sensitive EPT: 3.0%   *Attribute 2 genera:* 0

% Non-Insect Taxa: 60.0%   *Attribute 3 genera:* 2

HGMI Rating: **28.31**   **Fair**

Habitat Analysis: 151   Suboptimal   USEPA Protocol

Observations: Water temp: 5.86 C; Cond: 378 umhos; DO: 12.22 mg/L; pH: 7.65 SU

Clarity: slightly turbid; Flow Rate: fast; Width/Depth: >300' / 1'; Substrate: cobble, gravel, sand

Canopy: open; Bank Stability: fair; Bank Vegetation: trees, weeds

Stream Gradient: High Gradient Stream;   Land Uses: urban

Pipes / Ditches: storm sewers

Downstream of Impoundment: Dundee dam

Other: periphytes, trash