

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF WATER MONITORING AND STANDARDS  
BUREAU OF FRESHWATER AND BIOLOGICAL MONITORING  
P.O. Box 420; Mail Code 35-01  
TRENTON, NEW JERSEY

QUALITY ASSURANCE PROJECT PLAN  
Ambient Macroinvertebrate Network (AMNET),  
Northeast Water Region, 2023-24

Project Officer: *Anna Marie Signor* 6/15/2023  
Date

Anna Signor, Environmental Specialist 2  
NJDEP Bureau of Freshwater and Biological Monitoring (BFBM)

Project Supervisor: *Dean Bryson* 6/20/23  
Date

Dean Bryson, Environmental Specialist 4  
NJDEP Bureau of Freshwater and Biological Monitoring (BFBM)

Approved by: *Chris Kunz* 6/27/2023  
Date

Chris Kunz, Section Chief  
NJDEP Bureau of Freshwater and Biological Monitoring (BFBM)

Reviewed by: *Frank Klapinski* 7/27/2023  
Date

Frank Klapinski, Environmental Scientist 3  
NJDEP, Bureau of Environmental Analysis, Restoration, and Standards

Approved by: *Jenna Majchrzak* 7/31/2023  
Date

Jenna Majchrzak, Research Scientist 2  
NJDEP Office of Quality Assurance

## **Table of Contents**

- 1.0 Project Name**
- 2.0 Requesting Agency**
- 3.0 Date of Project**
- 4.0 Project Fiscal Information**
- 5.0 Project Oversight**
- 6.0 Special Training Needs/Certification**
- 7.0 Project Description/Objective**
- 8.0 Network Design/Site Selection**
- 9.0 Sampling Procedures**
- 10.0 Data Quality/Quality Control Requirements**
- 11.0 Macroinvertebrate Identification/QAQC**
- 12.0 Resource Needs**
- 13.0 Sampling Schedule**
- 14.0 Data Analysis**
- 15.0 Data Validation**
- 16.0 Performance System Audits**
- 17.0 Data Storage and Distribution**
- 18.0 Data Reporting**
- 19.0 Corrective Action**
- 20.0 References**

### **Appendix A- Data Management Tables**

**Table 1 Site List**

**Table 2 Field Measures**

**Table 3 Chemical Parameters**

**Table 4 Laboratory Methods**

### **Appendix B- Site Map**

### **Appendix C- Field and Laboratory Forms**

**Biological Field Observations Sheet**

**High Gradient Habitat Assessment Form**

**NJDOH Laboratory Sample Submittal Form**

**BFBM Biomonitoring Laboratory Macroinvertebrate Bench Sheet**

**1.0 Project Name:** Ambient Macroinvertebrate Network (AMNET), Northeast Water Region

**2.0 Requesting Agency:** NJDEP, Bureau of Freshwater and Biological Monitoring (BFBM)

**3.0 Date of Project:** July 2023 – June 2024

**4.0 Project Fiscal Information:** 35950000

**5.0 Project Oversight:**

Project Officer- Anna M. Signor, BFBM

Project Supervisor- Dean Bryson, BFBM

Project Data Analysis- Tom Miller, BFBM

Quality Assurance Officer - Jenna Majchrzak, NJDEP-OQA

**6.0 Special Training Needs/Certification**

All personnel assisting with field sampling and/or laboratory processing of samples for this project will be trained in all applicable methods and techniques. For physical/chemical analysis, the training will entail calibration of meters, deployment techniques, and data retrieval from the equipment. Assistants will also be trained in the proper methods for benthic macroinvertebrate sample collection and performing habitat assessments and observations. Training in the laboratory will entail the proper sorting of a subsample. Safety training and safety requirements will comply with Bureau of Freshwater and Biological Monitoring Field Work Health and Safety Plan (HASP) Version #2 August 2019 and any addendums to address Covid-19 precautions. The Project Officer will be responsible for all necessary training.

Only designated, experienced, full-time professional staff will perform taxonomic identifications.

BFBM (certified lab ID # 11896) and NJDOH (certified laboratory # 11036) are certified by the Office of Quality Assurance for all physical/chemical parameters to be measured in their respective laboratories.

**7.0 Project Description/Objective**

The major goal of the AMNET program is to provide a cost-efficient means of gauging the quality of streams and watershed areas throughout the state. This objective is accomplished through sampling and analysis of macroinvertebrate communities from a stream network representative of New Jersey's five (5) major Water Regions (Northwest Upper Delaware, Lower Delaware, Northeast, Raritan, and Atlantic). A rotating basin approach is utilized to sample each of the state's five Water Regions. The full complement of sites within one of the state's five Water Region are sampled over the course of roughly a year, providing a full statewide assessment every 5 years. In addition to adequately assessing the major Water Regions, sites were also selected to represent and assess individual sub-watersheds, delineated at HUC14 scale (14-digit Hydrologic Unit Code). The study area of the Northeast Water Region includes Watershed Management Areas WMA's 3, 4, 5, and 6.

The spatial distribution of stations is adequate to provide biological data on a long-term watershed, region-wide, or statewide scale. It is not sufficient, however, to assess the biological impact(s) of one-point source or sources of pollution, as this would be better served by a site-specific or intensive survey of the stream segment in question. The designated 5- year rotating sampling interval for AMNET reflects a realistic temporal lag between cessation of an environmental perturbation and recovery of the impacted biological community.

The AMNET program was initiated in 1992. To date, six full rounds of statewide monitoring have been completed. Sampling of the Northeast Water Region in 2023-2024 continues the seventh round of statewide AMNET monitoring.

### **7.1. Data Usage**

Data obtained will be used by NJDEP in the generation of the biennial Integrated Water Quality Monitoring and Assessment Report (includes 305(b) report and 303(d) list), to support sound policy decisions in water quality/watershed management, in designation of Category One (C1) waters based on “exceptional ecological significance”, to track environmental trends with water quality, to inform regulatory or “permit” activities, and to correlate nutrient concentrations with biological impairments. Once all samples are analyzed and the data thoroughly reviewed, a summary data table including the index scores and ratings will be posted on the BFBM website: [www.nj.gov/dep/wms/bfbm](http://www.nj.gov/dep/wms/bfbm).

### **8.0 Network Design/Site Selection**

The study area of the Northeast Water Region encompasses WMA 3, 4, 5, and 6. This round of sampling in the Northeast Water Region includes 114 sites (See Appendix A, Table 1). Sites were initially selected using a stratified approach to ensure complete and representative coverage of the Water Region. Since inception, refinements to the network have been instituted to better assess the sub-watersheds of the Water Region at a HUC14 (14-digit Hydrologic Unit Code) scale. The HUC14 is the assessment unit for Aquatic Life Use attainment used in the Integrated Water Quality Assessment Report. With this round, some sites have been re-located to alleviate the potential influence of lakes or impoundments. Also, to address specific data needs in this Water Region provided by NJDEP’s Bureau of Environmental Analysis, Restoration, and Standards (BEARS), some additional targeted sites have been added for this round of sampling. These sites are in previously unmonitored HUC14’s or where additional data is needed in a specific HUC14. Furthermore, some targeted sites have been added to provide data to inform of possible Category One (C1) designations, based on “exceptional ecological significance”. All additional targeted sites are included in the site list.

All site coordinates are logged into the Geographic Information System (GIS). The vehicle used for sampling is equipped with a Global Positioning System (GPS) unit with site locations uploaded. Also, a hand-held GPS unit, either Garmin model “GPSMAP 62s”, Garmin Nuvi 2797, or Trimble “Geo XT”, will be used to confirm correct locations at the time of sampling.

## 9.0 Sampling Procedures

### Macroinvertebrate Sampling

Sampling methods are based on the USEPA's Rapid Bioassessment Protocols (USEPA, 1999). Benthic macroinvertebrates will be sampled at each site focusing on the most productive habitats present at the site, as outlined in the Rapid Bioassessment Protocols (USEPA 1999) and BFBM's Standard Operating Procedures (SOP) For Ambient Biological Monitoring Using Benthic Macroinvertebrates (NJDEP 2007). An 800x900µm mesh D-frame dip net will be used to collect samples from the most productive habitat types present in the stream. New Jersey has two distinctly different geologic regions separated by the "Fall Line". This geologic boundary divides New Jersey roughly in half, with the hilly, bedrock terrain of the Piedmont, Valley and Ridge, and Highlands physiographic provinces in the north and the relatively flat and sandy Coastal Plain in the south.

Sites in the Northeast Water Region are north of the "Fall Line", and therefore these rivers and streams are considered high gradient, with bottom substrate consisting predominantly of cobble, boulder, and gravel. In these high gradient streams, macroinvertebrate abundance and diversity are usually highest in riffle/run habitat, which is therefore the focus of sampling. Riffle habitat is characteristically shallower with faster flow and surface turbulence caused by the coarse, rocky bottom substrate. Run habitat, which typically precedes a riffle, is somewhat deeper flowing water and flat on surface. The sampler will use their feet and/or hands to dislodge organisms from these substrates, immediately upstream of the net, using the current to carry into the net.

All material collected in the net (sediment, detritus, leaves, woody debris, and macroinvertebrates) is deposited into a sieve bucket and rinsed in the stream to remove fine sediment. Larger debris is rinsed to remove adhering organisms and discarded. The contents of bucket are then transferred to a one-liter sample bottle and preserved on site using a 5-10% formalin solution. A pre-printed label denoting the station identifier, stream name and location (see Table 1) is affixed to the sample container. The collection date and the initials of the samplers are also written on the label. Specimens fixed with formalin will remain preserved indefinitely. Sample containers are re-usable wide-mouthed plastic jars, thoroughly rinsed after previous use.

Each site in the Water Region will be sampled one time within the April through November sampling window. Sampling will be postponed at a site if flow conditions have increased due to a storm event, making it temporarily unsafe to wade. Sampling will be rescheduled when the stream returns to normal wadable flow conditions.

For quality control, a duplicate macroinvertebrate sample will be taken at an adjacent reach at approximately 10% of the samples. This adjacent reach for the duplicate sampling will usually be immediately upstream from the point where sampling for primary sampling ended. The reaches for both the primary and duplicate samples should be similar in terms of habitat, riparian zone condition, and land use. The results from only the primary sample will be reported. The duplicate results will be stored internally and used to provide precision estimates of the individual metrics and overall index scores and ratings (Stribling, 2008).

## **Physical/Chemical Parameters**

Dissolved oxygen, pH, Water Temperature, and Specific Conductivity will be measured in situ, at each site as per procedures outlined in N.J.A.C. 7:18 et. seq. and NJDEP Field Sampling Procedures Manual (2005 or 2022 edition, as available). BFBM (#11896) is certified by NJDEP's OQA to perform these analyze-immediately parameters. The measurements are made mid-depth, mid-stream. Turbidity will also be measured from a grab sample taken mid-depth, mid-stream.

## **Habitat Assessment**

A visual-based habitat assessment will be performed at each site using the format given in USEPA's Rapid Bioassessment Protocols (USEPA, 1999) for high gradient or low gradient streams (USEPA, 1999). This method, which assesses 10 different in-stream and riparian zone parameters, is tabulated for each site. Based on the score, the habitat is rated as optimal, suboptimal, marginal, or poor. The habitat assessment is performed concurrent with the collection of the benthic macroinvertebrate sampling. The stream reach sampled plus the immediate upstream area which can be adequately observed, will be assessed using the respective protocol. The habitat assessment score and rating will be presented along with the index score and rating. The habitat assessment score and rating do not factor into the calculation of the index score but is collected along with field observations, as additional information in the assessment of sampling results. Digital photographs are taken at each site on both the upstream and downstream side of any road crossing, and of any other feature of note, to document potential stressors.

## **Nutrient Samples**

A grab sample for Total Phosphorus (TP), Total Nitrogen (Nitrite-Nitrate (NO<sub>2</sub>-NO<sub>3</sub>) and Total Kjeldahl Nitrogen (TKN)) analyses will be collected at each AMNET site on the same day as macroinvertebrate sampling. The sample will be collected at the downstream boundary of the biological sampling reach, at mid-depth, center-of-flow, prior to the biological sampling and any disturbance of bottom substrate upstream. The sample will be collected directly into a dedicated 500 ml single-use sample bottle as per "NJDEP Field Sampling Procedures Manual", updated 2022. The nutrient sample will be preserved in the field with sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) to pH<2. Also, in the field, the site identifier, time and date of collection, and initials of sampler is written on lid with a marker and placed in cooler of ice. Upon returning to the BFBM laboratory, the sample bottle will be labeled with a pre-printed Preserved Nutrients label obtained from the Department of Health and the sample number label is affixed corresponding to the AMNET site information. The NJDOH Laboratory Sample Submittal Form is also completed with all site information, sample collection information, laboratory sample number and signed. The sample will be stored in the sample refrigerator at less than 4.0 degrees C until delivery to the New Jersey Department of Health (NJDOH) Public Health and Environmental Laboratories (#11036) within the prescribed holding time. The NJDOH laboratory is certified to perform the requested nutrient analyses in non-potable water. This nutrient data, collected concurrent with macroinvertebrate sampling, will be used to establish possible relationships between nutrient concentrations and biological impairments.

## **Field Precautions for Invasives**

To prevent the potential spread of nuisance or invasive organisms such as *Didymosphenia* sp. from stream to stream, all nets, waders, etc. will be decontaminated in the field between sites by spraying with an antibacterial spray such as Fantastik (heavy duty) and rinsing with tap water. Also, the use of felt-soled waders will be avoided.

## 10.0 Data Quality/Quality Control Requirements

Water Temperature, pH, Specific Conductivity, and Dissolved Oxygen (DO) are measured using a multi-parameter water quality meter such as the Hydrolab MS5, YSI ProDSS, or equivalent. These multi-parameter meters combine Temperature, pH, Specific Conductivity and Luminescent DO probes into one device that is submersible to the desired depth. All equipment will be calibrated, maintained, and used following manufacturer's instructions and in accordance with the specifications given in the analytical method being followed, as well as N.J.A.C. 7:18-3 and 7:18-8 (NJDEP, as amended September 2018).

Conductivity (SM 2510 B-11): This probe is calibrated on a weekly basis per the manufacturer recommendations. The probe is also checked each day of use with a certified standard which corresponds to the expected range of the values to be measured. The check standard is required to read within  $\pm 1\%$  of the true value of the standard prior to using the meter. Records of all calibrations and calibration checks shall be maintained in a bound field logbook, signed, and dated by the field technician. Expected range of measurements is 20-6,000  $\mu\text{S}/\text{cm}$ .

Dissolved Oxygen (Hach 10360 – 10/2011 Rev 1.2): A Winkler check is performed on a weekly basis and the meter is barometrically calibrated once on day of use. A calibration check using fully oxygenated water is performed once daily. A 100% oxygen saturated water bath is checked at the beginning and end of day when in use. Records of all calibrations and calibration checks shall be maintained in a bound field logbook, signed, and dated by the field technician. Expected range of measurements is 0.20–16.00 mg/L.

pH (SM 4500-H B-11): The probe is calibrated each day of use with two certified buffers that bracket the expected range of the value being measured per the manufacturer recommendations. A third certified pH buffer, within the bracket, is then used to check the calibration. After three hours of continuous use, the pH of the third certified buffer will be checked. Records of all calibrations and calibration checks shall be maintained in a bound field logbook, signed, and dated by the field technician. The expected range of measurements is 3.0-9.5.

Temperature (SM 2550 B-10): The probe is calibrated with a NIST-certified thermometer on a quarterly basis. Records of the calibration shall be maintained by the BFBM. Expected range of measurements is 1.0-35.0°C.

Barometer: Thommen TX Mechanical Barometer, if needed to compensate for the multi-parameter meter.

Turbidity meter (SM 2130 B-11): Hach Model 2100P turbidimeter is calibrated once a month per manufacturer's recommendation. The meter is then checked with certified standards for accuracy within the calibration range during each day of use. The check standard is required to read within  $\pm 10\%$  of the true value of the standard prior to using the meter. Records of all calibrations and calibration checks shall be maintained in a bound field logbook, signed and dated by the field technician. The expected range of measurement is 0.2-900 NTU.

### **Chain of Custody**

No chain of custody will be used for the macroinvertebrate samples. Macroinvertebrate sample information including site identifier, stream and location, time, date, and samplers is recorded on Biological Field Observation Sheet (Appendix C- Biological Field Observation Sheet) in the field when sample is collected. Upon returning to the laboratory, the sample is logged into Access database by transcribing information from the Biological Field Observation Sheet. A chain of custody (Appendix C - NJDOH Laboratory Sample Submittal Form) is required for the nutrient samples since they are being submitted to NJDOH Laboratory for analysis. The project officer and project supervisor are responsible for sampling and laboratory method validation.

## **11.0 Macroinvertebrate Identification/QAQC**

### **Macroinvertebrate Identification**

In the laboratory, a 100-organism subsample will be randomly sorted from each sample, as described in USEPA (1999); all individuals will be identified to the lowest possible taxonomic level (usually genus or species). Macroinvertebrate taxonomists performing identifications in the BFBM laboratory will be required to pass internal QA/QC checks to demonstrate competency and to ensure identifications are accurate and consistent. A thorough program for taxonomic quality control, as given in the biomonitoring laboratory Standard Operating Procedures (SOP) is practiced (NJDEP, 2007). A comprehensive collection of over 50 major references (including books and monographs), by recognized experts in invertebrate taxonomy, is maintained in the laboratory; new references are added when appropriate to keep abreast of taxonomic advances.

For taxonomic quality control, 10% of the samples are sent to an outside qualified consultant for parallel identifications. This consultant will be determined through the procurement bid process. The specifications for awarding the bid will include a review of the candidate vendor's taxonomic staff qualifications as well as their QA/QC protocols to ensure accurate identifications. Results of the parallel identifications will be analyzed by calculating the Percent Taxonomic Disagreements (%PTD), using procedure defined by Stribling *et al.*, 2003. The project goal is less than 15% disagreements. If %PTD is exceeded, either for individual samples or laboratory average, the independent laboratory is consulted to determine the likely sources of disagreements which will be used to inform BFBM if corrective measures are needed such as: additional training, acquiring additional references or keys, or changes to target identification levels. Data from the duplicate identifications will be stored internally, with only the BFBM identifications being reported.

### **Internal Approval of New BFBM Macroinvertebrate Taxonomists**



New macroinvertebrate taxonomists performing macroinvertebrate identifications in the BFBM laboratory for this project or other BFBM projects, will be required to complete these internal QA/QC steps first, to demonstrate competency and to ensure that identifications are accurate and consistent. The QA/QC procedure below is a one-time process to verify the quality of taxonomic data produced by the new BFBM taxonomist.

A new taxonomist will be provided samples to complete the entire processing, subsampling and identification following methods outlined in the SOP (NJDEP, 2007). When the identification of the subsample is completed, the sample will be re-identified and re-enumerated by a BFBM-approved taxonomist. The %PTD will be calculated with two independent data sets. A %PTD value of  $\leq 15\%$  is the target criterion. The new BFBM taxonomist will be approved to start working independently on samples once they have met the 15% PTD criterion on a minimum of three consecutive re-identified samples and with approval of the laboratory supervisor.

Currently, BFBM-approved taxonomists Anna Signor and Dean Bryson have demonstrated competency through samples re-identified by a third-party independent laboratory.

### **Equipment for Macroinvertebrate Identification**

Macroinvertebrates will be identified using a stereomicroscope capable of up to 40x magnification. The biomonitoring laboratory uses Leica Model MZ6 stereomicroscopes, each with fiber optic illumination. A compound microscope with objectives enabling 100x, 200x, 400x, and 1000x magnification will be used for highly detailed identifying features. The biomonitoring laboratory currently uses Leica models DMLS (with phase contrast) and DME. Microscopes are serviced annually by a trained technician to the manufacturer's specifications, to ensure optimal performance by proper alignment of lenses and lubrication of moving parts.

## **12.0 Resource Needs**

Hourly staff assist in field collections, laboratory processing and sorting of samples, and data entry.

## **13.0 Sampling Schedule**

All sites in the Northeast Water Region will be sampled once between July 1<sup>st</sup>, 2023, through June 30<sup>th</sup>, 2024, within the April through November index period.

## **14.0 Data Analysis**

Multi-metric indices were developed for use in New Jersey, with guidance from the Rapid Bioassessment Protocols (USEPA, 1999), to assess the taxonomic data. The High Gradient Macroinvertebrate Index (HGMI) and the Coastal Plain Macroinvertebrate Index (CPMI100) will be used for the appropriate sites in the Northeast Water Region. Based on the index score, a rating is assigned, Excellent, Good, Fair, and Poor. Detailed methods for analysis are outlined in the biomonitoring laboratory Standard Operating Procedures (NJDEP, 2007).

## **15.0 Data Validation**

The Project Officer and the Project Supervisor are responsible for all initial data validation. If apparent anomalous data is suspected, the Project Officer and/or the Project Supervisor will review the sampling procedures with the field sampler to make sure the proper collection and preservation procedures were followed. If the data is still suspect, an internal review of the laboratory procedures and/or calculations used in the analysis of the suspect sample, with special emphasis on transcription of data to assure that no transposition of figures occurred will be conducted. If no problems are found in the laboratory procedures, the data may then be compared to any historical data that might have been collected at the same site prior to the most recent sampling event to see if similar anomalies might have been found previously. The suspect data may also be compared to literature values or standard analytical treatises to verify if the results are within the limits of accuracy of the test method.

If no obvious problems are found after these reviews, the complete data set will be reported with the suspect data identified as it relates to the objectives(s) and data accuracy required in this project.

## **16.0 Performance System Audits**

BFBM is subject to audits and guidelines of the Office of Quality Assurance's Laboratory Certification Program as well as internal performance evaluations.

NJDEP-OQA will be notified of anticipated sampling schedule to allow for field audit if time permits.

## **17.0 Data Storage and Distribution**

All habitat assessment data, physical/chemical analysis, and site observations will be recorded on the BFBM's Biological Field Observations and Data Sheet and recorded electronically in a Microsoft Access database. All macroinvertebrate identifications will be recorded on the BFBM's Macroinvertebrate Laboratory Data Sheet and entered a Microsoft Access database. By June of the year following review and validation, all taxonomic data and counts, metric scores, index scores and ratings, habitat assessment scores and ratings, analyze-immediately field parameters and nutrient results will be uploaded into USEPA's water quality data repository, now called the Water Quality Exchange (WQX). The data will be available for download from the Water Quality Portal, ([waterqualitydata.us/portal](http://waterqualitydata.us/portal)). All raw data records shall be maintained for a period of no less than five years.

## **18.0 Data Reporting**

Results and data analysis for the entire Water Region will be issued and will contain at a minimum: datasheets for each site with taxa and counts of benthic macroinvertebrates, field chemistry results and observations, HGMI scores and index ratings, habitat assessment scores and ratings. Index scores and ratings will also be posted in tabular form on the Bureau's website. The appropriate GIS shapefiles of the study area will be updated to reflect these

results.

<u>Assessment Rating</u>	<u>HGMI Score</u>
Excellent	$\geq 63$
Good	42- $<63$
Fair	21- $<42$
Poor	$<21$

Please note: the data being collected during this project will not be used for regulatory purposes

## 19.0 Corrective Action

The Project Officer will be responsible for the oversight of all field and laboratory activities related to this project. The Project Officer will assess field collections functions and make corrections when necessary to maintain the data accuracy as defined in this plan. Project Data Manager is responsible for formatting and uploading data into WQX, after thorough review. If any changes or modifications are made to this plan regarding data collection, as it relates to the objective(s) and data accuracy required in this project, all original signees of the QAPP will be notified.

## 20.0 References

Gerritsen, Jeroen and Erik W. Leppo, 2005. Biological Condition Gradient for Tiered Aquatic Life Use in New Jersey. Tetra Tech Inc., Owings Mill, MD.

Jessup, Benjamin, 2007. Development of New Jersey High Gradient Macroinvertebrate Index. Tetra Tech Inc., Owings Mill, MD.

NJDEP, updated 2022. Field sampling procedures manual. NJDEP, Trenton, NJ.

NJDEP, as amended September 2018. Regulations governing the certification of laboratories and environmental measurements. N.J.A.C. 7:18. NJDEP. Trenton, NJ.

NJDEP, 2007. Standard operating procedures (SOP) for the ambient biological monitoring using benthic macroinvertebrates. Doc.#BMNJ2, NJDEP, BFBM. Trenton, NJ. [www.state.nj.us/dep/wms/bfbm/download/AMNET\\_SOP.pdf](http://www.state.nj.us/dep/wms/bfbm/download/AMNET_SOP.pdf)

Stribling, J. B., S. R. Moulton, and G. L. Lester, 2003. Determining the quality of taxonomic data. J.N. Am. Benthol. Soc. 22:621-631.

Stribling, J.B., B.K. Jessup, and D.L. Feldman, 2008. Precision of benthic macroinvertebrate indicators of stream condition in Montana. J.N. Am. Benthol. Soc. 27(1):58-67.

USEPA, 1999. Rapid bioassessment protocols for use in streams and rivers: periphyton, benthic macroinvertebrates, and fish. Second edition. EPA 841-B-99-002. U.S. Environmental

Protection Agency. Washington, D.C. Ch. 1–11 and appendices.

## Appendix A- Data Management Tables

**Table 1 Site List**

Station	WMA	Stream/Location	County	D-Longitude	D-Latitude
AN0205	5	Hackensack River @ Old Tappan Rd	Bergen	-74.00841901	41.0123399
AN0206	5	Musquapsink Bk @ Harrington Ave	Bergen	-74.02324074	40.992315
AN0207A	5	Pascack Bk @ Westwood Ave/Demarest Ave	Bergen	-74.02572001	40.996641
AN0208A	5	Sparkill Bk @ off Union St	Bergen	-73.94027931	41.0082237
AN0209	5	Tenakill Bk @ Cedar La / Closter Dock	Bergen	-73.96730846	40.9785088
AN0210	5	Dorotockeys Run @ Tappan Rd	Bergen	-73.9748202	40.9874832
AN0210A	5	Hirshfeld Bk @ River Rd	Bergen	-74.02011234	40.9473989
AN0211	5	Van Saun Bk @ Main St & Rt 4	Bergen	-74.03999469	40.9111061
AN0212	5	Overpeck Ck @ Dean Dr	Bergen	-73.96914184	40.9066548
AN0213	6	Passaic River @ Tempe Wicke Rd	Morris	-74.56989136	40.7717832
AN0214	6	Indian Grave Bk @ Hardscrabble Rd N of Old Army Rd	Somerset	-74.5511883	40.7414284
AN0215A	6	Primrose Bk @ Jockey Hollow Rd	Morris	-74.52964604	40.7650425
AN0216	6	Primrose Bk @ Lees Hill Rd / Madisonville	Morris	-74.51540971	40.7286874
AN0217	6	Catfish Brook (Silver Brook) @ Blackwells Place	Morris	-74.50625582	40.7678346
AN0218	6	Great Bk @ Blackberry Lane	Morris	-74.47692088	40.7734978
AN0219	6	Great Bk @ end of Woodland Rd	Morris	-74.4740784	40.7251241
AN0220	6	Loantaka Bk @ Bluestone Terrace	Morris	-74.46073616	40.7717927
AN0223	6	Black Bk @ New Vernon Rd	Morris	-74.4759212	40.7012173
AN0224	6	Passaic River @ Passaic Valley Rd (Rt 512)	Morris & Somerset	-74.5296862	40.6647783
AN0226	6	Dead River @ off Somerville Rd	Somerset	-74.5930942	40.6592962
AN0227	6	Dead River @ King George Rd (Rt 651)	Somerset	-74.52420671	40.649738
AN0227A	6	Harrison Bk @ off Valley Rd	Somerset	-74.57479722	40.6590901
AN0230	6	Passaic River @ Summit Ave Chatham Rd	Morris & Union	-74.37751649	40.7343129
AN0230B	6	UNT Passaic River @ Off Glenwood	Essex	-74.30327913	40.839587
AN0231	6	Passaic River @ Eagle Rock Ave	Morris & Essex	-74.33508058	40.8276266
AN0231A	6	Passaic River @ Passaic Ave	Morris & Essex	-74.36133557	40.7557874
AN0231C	6	Slough Bk @ Parsonage Hill Rd	Essex	-74.34919411	40.7589645
AN0231D	6	Canoe Bk @ Parsonage Hill Rd	Essex	-74.3369352	40.7487985
AN0231E	6	Canoe Bk @ E. McClellan St	Essex	-74.29824473	40.8016868
AN0232	6	UNT to Whippany River (Dismal Bk) @ Mt Pleasant Rd	Morris	-74.5692688	40.8121331
AN0233	6	Whippany River @ Whitehead Rd	Morris	-74.52986289	40.7968024
AN0233A	6	Whippany River @ Lake Valley Rd	Morris	-74.49740481	40.8126186
AN0234A	6	Watnong Bk @ Lake Rd	Morris	-74.49356981	40.8140189
AN0235	6	Whippany River @ Jefferson Rd	Morris	-74.44017006	40.8195464
AN0235A	6	Black Bk @ nr Ridgedale Ave and State Hwy 10	Morris	-74.3945972	40.810556

AN0236	6	Troy Bk @ Lake Dr	Morris	-74.44470103	40.8830858
AN0237	6	Troy Bk @ Beverwyck Rd	Morris	-74.38987897	40.8544049
AN0238	6	Whippany River @ end of Edwards Rd	Morris	-74.34705011	40.8453113
AN0238B	6	Malapardis Bk @ Mt. Pleasant Ave	Morris	-74.41932424	40.823902
AN0239	6	Russia Bk @ Milton-Dover Rd	Morris	-74.52755427	41.0197236
AN0239A	6	Russia Bk @ Russia Rd	Morris	-74.53147839	41.0386153
AN0241	6	Rockaway River @ Berkshire Valley Rd	Morris	-74.59486	40.93108
AN0242	6	Green Pond Bk @ Mt Pleasant Tpk & Rt 15	Morris	-74.56783425	40.9043751
AN0243	6	Rockaway River @ Rt 513 & E Blackwell Rd	Morris	-74.53349095	40.8802736
AN0244	6	Mill Bk @ Palmer Rd Franklin Rd	Morris	-74.52532257	40.8787714
AN0245	6	Beaver Bk @ Meriden Rd	Morris	-74.46031299	40.9469595
AN0245A	6	Hibernia Bk @ Meriden Rd	Morris	-74.48686037	40.9306073
AN0246	6	Beaver Bk @ Morris Ave	Morris	-74.49705575	40.9061344
AN0247	6	Den Bk @ Mt Pleasant Tpk	Morris	-74.51719501	40.8685096
AN0248	6	Rockaway River @ Pocono Rd at St Clair Hosp	Morris	-74.46312482	40.8943679
AN0249	6	Stony Bk @ Valley Rd	Morris	-74.43754218	40.928856
AN0250	6	Rockaway River @ under Morris Ave	Morris	-74.4098835	40.9029774
AN0251	6	Rockaway River @ Green Bank Rd	Morris	-74.38785465	40.899436
AN0254	6	Crooked Bk @ River Rd	Morris	-74.37356912	40.8902388
AN0255	3	Wanaque River @ Fire Lane off E Shore Dr	Passaic	-74.31665622	41.1635466
AN0255D	3	Green Bk @ Union Valley Rd (Rt 513)	Passaic	-74.35897383	41.1527387
AN0255E	3	Belcher Ck @ Dockerty Hollow Rd	Passaic	-74.39175558	41.1100346
AN0256A	3	Meadow Bk @ Warren Hagstrom Blvd	Passaic	-74.28569156	41.0428338
AN0256B	3	Ringwood Ck @ park trail off Margaret King Rd	Passaic	-74.26577225	41.1272199
AN0256C	3	West Bk @ Westbrook Rd	Passaic	-74.33731491	41.0871615
AN0257	3	Wanaque River @ Wanaque Ave	Passaic	-74.2921413	41.0073498
AN0258	3	Pequannock River @ Rt 515	Sussex	-74.51373574	41.1152757
AN0258A	3	Pacock Bk @ Canistear Rd	Passaic	-74.47235223	41.1365068
AN0259	3	Pequannock River @ Rt 23N nr Canistear Rd	Passaic & Morris	-74.48906987	41.0780561
AN0260	3	Mossmans Bk @ Clinton Rd N of Clinton Res	Passaic	-74.4343787	41.1069343
AN0261	3	Clinton Bk @ La Rue Rd	Passaic	-74.44046485	41.0597021
AN0262	3	Kanouse Bk @ Kanouse Rd	Passaic	-74.42958529	41.0474333
AN0264	3	Pequannock River @ Rt 23	Passaic & Morris	-74.40105593	41.0184544
AN0265	3	Pequannock River @ Main St (Rt 511)	Morris & Passaic	-74.33476944	41.0035305
AN0266	3	Ramapo River @ Rt 202 near Rt 17	Bergen	-74.16544417	41.0967886
AN0266C	3	Ramapo River @ off Rt 202	Bergen	-74.19143119	41.0774247
AN0266D	3	Bear Swamp Bk @ Bear Swamp and Deerhaven Rds.	Bergen	-74.20920254	41.0666178
AN0266E	3	Mahwah River @ Brakeshoe Pl	Bergen	-74.15541258	41.1040108
AN0267	3	Ramapo River @ Lenape Lane	Bergen	-74.24126859	41.0366702
AN0267J	3	Pond Bk @ Rt 202 and Franklin Ave	Sussex	-74.2365873	41.0291618

AN0268	3	Pompton River @ Rt 504 Newark Pompton Tpk	Morris & Passaic	-74.27951103	40.9433979
AN0269	3	Dam Bk Trib to Pompton River @ Ryerson Rd	Morris	-74.29307911	40.9265617
AN0271	4	Deepavaal Bk @ Little Falls Ave & Jane Rd	Essex	-74.26609754	40.8872808
AN0273	4	Preakness Bk @ Edison Dr	Passaic	-74.24671667	40.9115667
AN0274	4	Passaic River @ River View Dr	Passaic	-74.22333144	40.8875711
AN0274A	6	Passaic River @ end of Willard Lane	Morris & Essex	-74.33653903	40.9009322
AN0275	4	Peckman River @ McBride Ave	Passaic	-74.21147952	40.8920547
AN0275A	4	Peckman River @ Bradford Ave	Essex	-74.23423279	40.8482178
AN0276	4	Molly Ann Bk @ off Totowa Ave Bridge	Passaic	-74.19038566	40.9144772
AN0277	4	Goffle Bk @ Wagaraw Rd	Passaic	-74.16286098	40.9389921
AN0278	4	Diamond Bk @ Harristown Rd	Bergen	-74.14196239	40.9478086
AN0281	4	Saddle R @ E Allendale Ave	Bergen	-74.10015778	41.0319187
AN0282	4	Saddle R @ E Ridgewood Ave	Bergen	-74.09244154	40.9726017
AN0283	4	Hohokus Bk @ Old Mill Rd	Bergen	-74.19359555	41.0259573
AN0285	4	Hohokus Bk @ Park Ave	Bergen	-74.13651979	41.024459
AN0288	4	Hohokus Bk @ Spring St	Bergen	-74.10850807	40.9735234
AN0289	4	Saddle R @ Dunkerhook Rd	Bergen	-74.09871453	40.9463081
AN0290	4	Saddle R @ Railroad Ave	Bergen	-74.08115426	40.9035686
AN0291	4	Saddle R @ Marsellus Place & Saddle River Ave	Bergen	-74.10156412	40.8640882
AN0292	4	Third River @ Kingland Rd	Passaic	-74.14164446	40.8266271
<b>BFBM000090</b>	<b>6</b>	<b>Whippany R @ Washington Valley Rd</b>	<b>Morris</b>	<b>-74.521244</b>	<b>40.803938</b>
<b>BFBM000206</b>	<b>6</b>	<b>Silver Bk @ James St</b>	<b>Morris</b>	<b>-74.48691</b>	<b>40.762019</b>
<b>BFBM000387</b>	<b>3</b>	<b>Pequannock R @ Vernon Stockholm Rd abv village</b>	<b>Sussex</b>	<b>-74.496035</b>	<b>41.146947</b>
<b>BFBM000388</b>	<b>3</b>	<b>Belcher Creek @ Bergen Drive</b>	<b>Passaic</b>	<b>-74.39939172</b>	<b>41.1030206</b>
<b>BFBM000389</b>	<b>6</b>	<b>Rockaway River @ Cozy Lake Road</b>	<b>Morris</b>	<b>-74.50978064</b>	<b>41.01135161</b>
<b>BFBM000390</b>	<b>6</b>	<b>Whippany River @ Inamere Road</b>	<b>Morris</b>	<b>-74.50523728</b>	<b>40.81266162</b>
<b>BFBM000391</b>	<b>3</b>	<b>Pequannock R @ Vernon Stockholm Rd below village</b>	<b>Sussex</b>	<b>-74.506160</b>	<b>41.119617</b>
<b>BFBM000392</b>	<b>6</b>	<b>Beaver Bk @ Old Beach Glen Rd</b>	<b>Morris</b>	<b>-74.479623</b>	<b>40.931403</b>
<b>BFBM000393</b>	<b>6</b>	<b>Mill Bk @ Moutainside Dr</b>	<b>Morris</b>	<b>-74.545013</b>	<b>40.867517</b>
<b>BFBM000394</b>	<b>6</b>	<b>White Meadow Bk @ Green Pond Rd</b>	<b>Morris</b>	<b>-74.500926</b>	<b>40.914272</b>
<b>BFBM000395</b>	<b>6</b>	<b>Hibernia Bk @ Green Pond Rd</b>	<b>Morris</b>	<b>-74.493460</b>	<b>40.943859</b>
<b>BFBM000396</b>	<b>6</b>	<b>Primose Bk @ Baileys Mill Rd</b>	<b>Morris</b>	<b>-74.529392</b>	<b>40.741580</b>
<b>BFBM000397</b>	<b>6</b>	<b>Den Bk @ Openaki Rd</b>	<b>Morris</b>	<b>-74.529062</b>	<b>40.853655</b>
<b>01378410</b>	<b>5</b>	<b>Dwars Kill @ old RR crossing off Blanch Ave</b>	<b>Bergen</b>	<b>-73.958</b>	<b>40.9836</b>
<b>01380300</b>	<b>6</b>	<b>Stony Brook @ Rockaway Valley Road</b>	<b>Morris</b>	<b>-74.42703894</b>	<b>40.94058851</b>
<b>BA124</b>	<b>3</b>	<b>Ramapo R near Jersey Av</b>	<b>Bergen</b>	<b>-74.157728</b>	<b>41.109172</b>
<b>BA144</b>	<b>6</b>	<b>Beaver Bk @ Ford Rd</b>	<b>Morris</b>	<b>-74.493989</b>	<b>40.912274</b>
<b>BA179</b>	<b>6</b>	<b>Passaic River @ Jockey Hollow Rd</b>	<b>Morris</b>	<b>-74.554837</b>	<b>40.756855</b>
<b>FIBI059</b>	<b>5</b>	<b>Pascack Bk @ Emerson Rd (Brookside Av)</b>	<b>Bergen</b>	<b>-74.008134</b>	<b>40.990001</b>

**Bold sites are targeted sites added per request from BEARS.**

**Table 2 Field Measures**

<b>Field Name</b>	<b>WQDE Name</b>	<b>Media</b>	<b>Units</b>
Water Temp	Temperature, Water	Water	deg C
Spec Cond	Specific conductance	Water	uS/cm
pH	pH	Water	None
DO	Dissolved Oxygen (DO)	Water	mg/l
Turbidity	Turbidity	Water	NTU

**Table 3 Chemical Parameters**



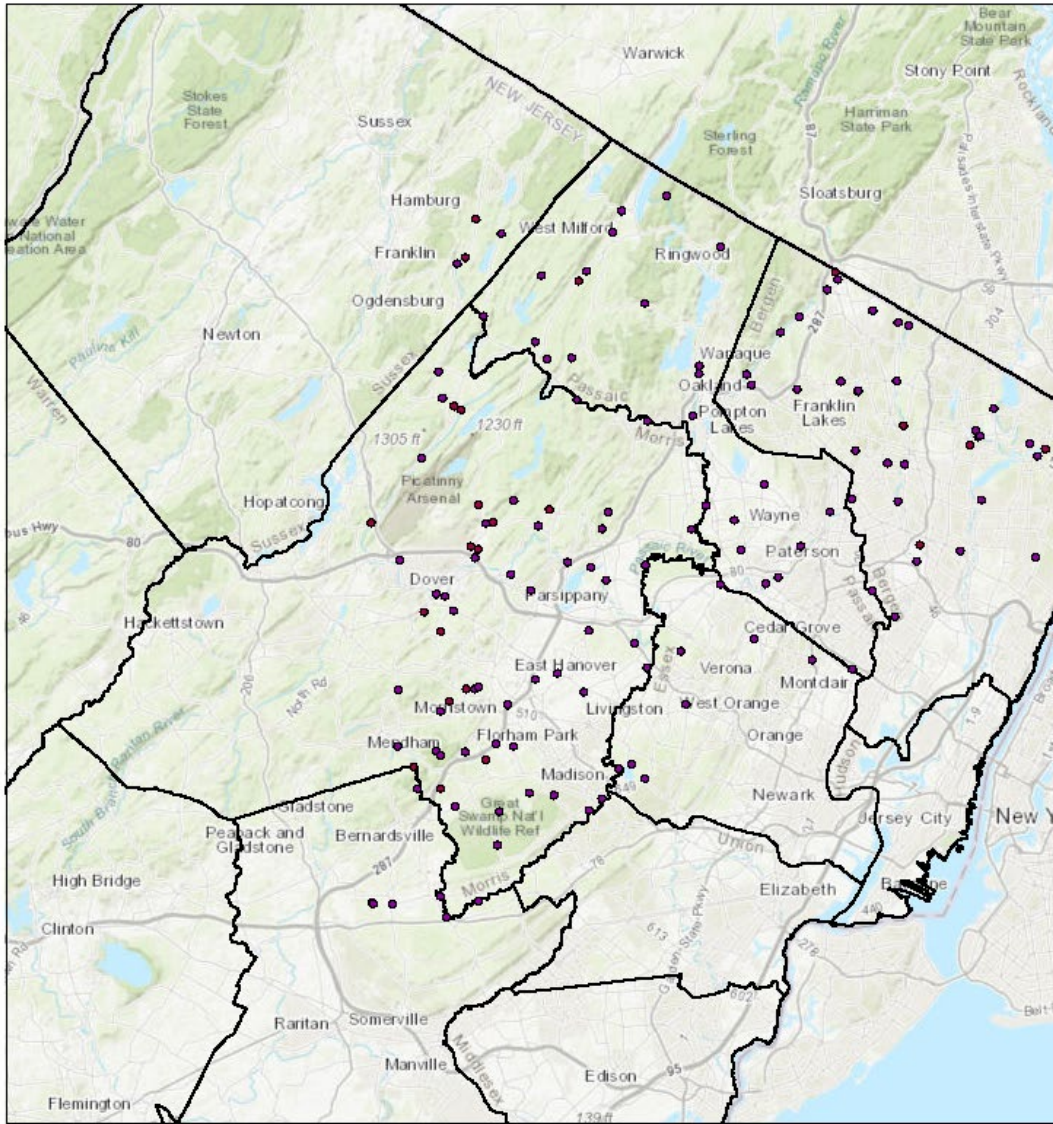
Analysis (lab name)	EPA Characteristic Name	Method Speciation Name	Result Sample Fraction	Result Measure Unit	Result Value Type	Sample Collection Type	Sample Collection Equipment
Nitrate + Nitrite as N	Inorganic nitrogen (nitrate and nitrite)	as N	Total	mg/l	Actual	Grab	Water Sampler (Other)
Total Kjeldahl Nitrogen	Kjeldahl nitrogen	as N	Total	mg/l	Actual	Grab	Water Sampler (Other)
Phosphorus, Total	Phosphate-phosphorus	as P	Total	mg/l	Actual	Grab	Water Sampler (Other)

**Table 4 Laboratory Methods**

Parameter	Laboratory	Lab Number	Method	Method ID Context	Lower Reporting Limit	units	Method Detection Limit	units	Holding Time	Preservative
Nitrite + Nitrate	NJDOH-PHEL	11036	4500-NO3(F)-16	SM	0.012	mg/l	0.0069	mg/l	28 days	pH<2, Ice to 4°C
TKN	NJDOH-PHEL	11036	351.2	USEPA	0.1	mg/l	0.041	mg/l	28 days	pH<2, Ice to 4°C
Total Phosphorus	NJDOH-PHEL	11036	365.1	USEPA	0.01	mg/l	0.007	mg/l	28 days	pH<2, Ice to 4°C

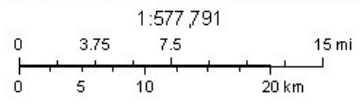
# Appendix B- Site Map

NEB 2023



5/31/2023, 3:16:32 PM

- NE\_AMNET\_Stations\_FINAL
- NorthEastShapefile - AMNET NEB
- ▭ Counties



Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS

NJDEP  
©NJDEP

## Appendix C- Field and Laboratory Forms

### Biological Field Observation Sheet (same for utilized for high and low gradient)

#### NJDEP-BFBM Biological Field Observations and Data Sheet HIGH Gradient

Date/Time: \_\_\_\_\_

Form completed by: \_\_\_\_\_

Bridge # \_\_\_\_\_

**Chemistries**

- \_\_\_\_\_ Temperature ( °C)
- \_\_\_\_\_ Conductivity (umhos)
- \_\_\_\_\_ DO (mg/L)
- \_\_\_\_\_ pH (SU units)
- \_\_\_\_\_ Turbidity (NTU)

**Water Clarity**

- Clear
- Slightly Turbid
- Turbid
- Color: \_\_\_\_\_

**Stream Flow**

- Slow
- Moderate
- Fast

\_\_\_\_\_ Width (ft)       estimated  
 \_\_\_\_\_ Depth (ft)       @ bridge

**Substrate**

- cobbles
- gravel / sand
- mud
- silt
- snags
- root mats
- undercut banks
- other: \_\_\_\_\_

**Dominant Bank Vegetation**

- trees
- shrubs
- tall grasses
- forbs
- lawns
- other: \_\_\_\_\_

**Bank Condition Observations**

(facing downstream)

	Left	Right
Stable	<input type="checkbox"/>	<input type="checkbox"/>
Visible erosion	<input type="checkbox"/>	<input type="checkbox"/>
Undercut	<input type="checkbox"/>	<input type="checkbox"/>
Reinforced	<input type="checkbox"/>	<input type="checkbox"/>

(leave blank if no obvious impacts)

**Canopy**

- Open
- Mostly Open
- Partly Open
- Mostly Closed
- Closed

**Land Uses**

- Agriculture: Cropland
- Agriculture: Livestock
- Commercial
- Urban
- Suburban
- Rural
- Forested
- Industrial
- Other: \_\_\_\_\_

**Site location Verified by:**

- GPS waypoint
- bridge #

**Land Use Comments:**

---

---

---

---

---

---

---

---

**Point Sources**

- Discharges
- Storm water outfalls
- Other
- Downstream of impoundment

---

---

---

---

---

---

---

---

name: \_\_\_\_\_  
 approx. distance: \_\_\_\_\_

**Picture #** \_\_\_\_\_Upstream \_\_\_\_\_Downstream \_\_\_\_\_ Bridge #

**Sampling location:** \_\_\_\_\_Upstream \_\_\_\_\_Downstream

**Present weather conditions:** \_\_\_\_\_

**Previous 24 hr weather event:** \_\_\_\_\_

**Other Observations: check all applicable**

- fish (Record any other observations below)
- frogs
- crayfish
- turtles
- clams / mussels
- salamanders
- macrophytes
- periphytes
- filamentous algae
- beaver dam
- surface sheen ( natural / oil )
- invasives

### High Gradient Habitat Assessment Form

## HABITAT ASSESSMENT FOR HIGH GRADIENT STREAMS

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
<b>1. Epifaunal Substrate/Available Cover</b>	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
<b>2. Embeddedness</b>	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space	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
<b>3. Velocity/Depth Regimes</b>	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
<b>4. Sediment Deposition</b>	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
<b>5. Channel Flow Status</b>	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
<b>6. Channel Alteration</b>	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 yr) 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
<b>7. Frequency of Riffles (or bends)</b>	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
<b>8. Bank Stability (score each bank)</b> 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)	10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	10 9	8 7 6	5 4 3	2 1 0
<b>9. Bank Vegetative Protection (score each bank)</b>	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)	10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	10 9	8 7 6	5 4 3	2 1 0
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	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)	10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	10 9	8 7 6	5 4 3	2 1 0

**HABITAT SCORE**

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

Field ID Number

New Jersey Department of Health and Senior Services  
Environmental and Chemical Laboratory Services  
PO Box 361, Trenton, NJ 08625-0361  
Phone: 609-530-2820  
**ORGANIC AND INORGANIC CHEMISTRY SAMPLE SUBMITTAL**

Lab Sample Number  
(For Lab Use Only)

AGENCY INFORMATION			
Submitting Agency NJDEP	Send Results To Carol O'Donnell-Kee	Agency No. 207	Project Name
Street Address 35 Arctic Parkway	Final Report Option <input type="checkbox"/> Tier 1 <input type="checkbox"/> Tier 2	Would you like copies of the internal chain of custody forms sent with your report? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Project Code BIONTR
	Electronic Report Option <input type="checkbox"/> EDD <input type="checkbox"/> E-2		Memo Number
City, State, Zip Code Trenton, NJ, 08625	Phone 609-292-0427	Fax 609-633-1095	Email

SAMPLE INFORMATION		
Sample Point/Station ID Number/Water Facility ID	Collection Date (YY/MM/DD) ___/___/___	Sample Type <b>Non-Potable:</b> <input checked="" type="checkbox"/> Stream/Surface <input type="checkbox"/> Ground Water <input type="checkbox"/> Private Well <input type="checkbox"/> Septic <input type="checkbox"/> Ocean/Saline <input type="checkbox"/> Sediment <b>Potable:</b> <input type="checkbox"/> Groundwater Rule <input type="checkbox"/> Source <input type="checkbox"/> Confirmation <input type="checkbox"/> Raw <input type="checkbox"/> Finished <input type="checkbox"/> Private Well Fraction: <input checked="" type="checkbox"/> Total <input type="checkbox"/> Dissolved Other: <input type="checkbox"/> _____ Priority: <input checked="" type="checkbox"/> Routine <input type="checkbox"/> Priority <input type="checkbox"/> Emergency
Sampling Site/Facility/Supply/Location/Sampling Point ID	Coll. Time (24h) Start _____ End _____	
Waterbody Name	Sample Retention Retain? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes Duration _____	<input type="checkbox"/> Tissue <input type="checkbox"/> Sewage: <input type="checkbox"/> Raw <input type="checkbox"/> Effluent <input type="checkbox"/> Industrial: <input type="checkbox"/> Raw <input type="checkbox"/> Effluent <input type="checkbox"/> At Source <input type="checkbox"/> Flushed <input type="checkbox"/> 1st Draw <input type="checkbox"/> Lead Source Line <input type="checkbox"/> Surface H <sub>2</sub> O Intake <input type="checkbox"/> Distribution System
Municipality/County	Type of Sampling Event <input checked="" type="checkbox"/> Regular <input type="checkbox"/> Compliance <input type="checkbox"/> Repeat <input type="checkbox"/> Non-Regulatory <input type="checkbox"/> Other If Repeat or GWR, List Original Lab Sample No.	
Sampling Point Street Address AMNET -	Sample Collector	
PWSID	Trip #	

FIELD INFORMATION		
Air Temp °C	Water Temp °C	Stream Flow-CFS
Weather Conditions	Sample pH (Field)	Gage Height-Ft.
Preserved in: <input type="checkbox"/> Field <input type="checkbox"/> Lab Date: ___/___/___ Time: _____	DO (mg/l)	Spec.Cond. (µS/CM)
	DO% Sat	Salinity (ppm)
Chlorine Residual	Sample Depth Ft.	Tide Stage
Comments	Barometric Pressure (mmHg)	Turbidity (NTU) 3.08

ANALYSIS REQUESTS		
<b>Metals</b> <input type="checkbox"/> Ag .....Silver <input type="checkbox"/> Al .....Aluminum <input type="checkbox"/> As .....Arsenic <input type="checkbox"/> B .....Boron <input type="checkbox"/> Ba .....Barium <input type="checkbox"/> Be .....Beryllium <input type="checkbox"/> Ca .....Calcium <input type="checkbox"/> Cd .....Cadmium <input type="checkbox"/> Co .....Cobalt <input type="checkbox"/> CR-T... Chromium <input type="checkbox"/> Cu .....Copper <input type="checkbox"/> Fe .....Iron <input type="checkbox"/> K .....Potassium <input type="checkbox"/> Mg.....Magnesium <input type="checkbox"/> Mn.....Manganese <input type="checkbox"/> Mo.... Molybdenum <input type="checkbox"/> Na .....Sodium <input type="checkbox"/> Ni .....Nickel <input type="checkbox"/> Pb .....Lead <input type="checkbox"/> Sb .....Antimony <input type="checkbox"/> Se .....Selenium <input type="checkbox"/> Si .....Silica <input type="checkbox"/> TI .....Thallium <input type="checkbox"/> U .....Uranium <input type="checkbox"/> V .....Vanadium <input type="checkbox"/> Zn .....Zinc <b>Preferred Methodology</b> <input type="checkbox"/> EPA 200.7 / 200.9 <input type="checkbox"/> EPA 200.8 <b>Residues</b> <input type="checkbox"/> Total Suspended Solids (TSS) <input type="checkbox"/> Total Solids (TS) <input type="checkbox"/> Total Dissolved Solids (TDS) <input type="checkbox"/> Settleable Solids (SS) <b>Other</b> <input type="checkbox"/> _____ <input type="checkbox"/> _____ <input type="checkbox"/> _____	<b>General</b> <input type="checkbox"/> Alkalinity <input type="checkbox"/> Bromide by IC <input type="checkbox"/> Chloride <input type="checkbox"/> Chloride by IC <input type="checkbox"/> Chromium, Hexavalent <input type="checkbox"/> Color <input type="checkbox"/> Conductance <input type="checkbox"/> Cyanide <input type="checkbox"/> Dissolved Oxygen <input type="checkbox"/> Fluoride <input type="checkbox"/> Fluoride by IC <input type="checkbox"/> Hardness <input type="checkbox"/> MBAS <input type="checkbox"/> Odor <input type="checkbox"/> pH <input type="checkbox"/> Phenols (PW) <input type="checkbox"/> Phenols (NPW) <input type="checkbox"/> Sulfate <input type="checkbox"/> Sulfate by IC <input type="checkbox"/> Turbidity <b>Mercury</b> <input type="checkbox"/> Mercury by EPA 245.1 <b>Nutrients</b> <input type="checkbox"/> Nitrite <input checked="" type="checkbox"/> Nitrite + Nitrate <input checked="" type="checkbox"/> Total Phosphorus <input type="checkbox"/> Ortho Phosphorus <input type="checkbox"/> Ammonia <input checked="" type="checkbox"/> Total Kjeldahl Nitrogen (TKN) <input type="checkbox"/> Nitrate (Calculated)	<b>Organics (Drinking Water)</b> <input type="checkbox"/> EPA 504.1 - EDB, DBCP, 123TCP <input type="checkbox"/> EPA 505 - Organochlorine Pest. & PCB's <input type="checkbox"/> EPA 507 - N and P containing Pesticides <input type="checkbox"/> EPA 515.3 - Chlorinated Acid Herbicides <input type="checkbox"/> EPA 524.2 - Purgeables <input type="checkbox"/> EPA 525.2 - Liquid-Solid Extractables <input type="checkbox"/> EPA 531.1 - N-Methylcarbamoyloximes and N-Methylcarbamates <b>Organics (Non-Potable Water)</b> <input type="checkbox"/> EPA 608 - Organochlorine Pest. & PCB's <input type="checkbox"/> EPA 624 - Purgeables <input type="checkbox"/> EPA 625 - Base/Neutral and Acid Extractables <b>Demands</b> <input type="checkbox"/> Total Organic Carbon (TOC) <input type="checkbox"/> Dissolved Organic Carbon (DOC) <input type="checkbox"/> Chemical Oxygen Demand (COD) <b>Suggested Dilutions</b> <input type="checkbox"/> BOD5 <input type="checkbox"/> BOD20 _____ <input type="checkbox"/> CBOD5 <input type="checkbox"/> CBOD20 _____
Relinquished By: Name (Print): _____ Signature: _____	Affiliation: NJDEP BFBM	Received By: Name (Print): _____ Signature: _____
	Affiliation:	Date/Time
		Reason for Custody Change

CHEM-44  
MAR 12

Distribution: White (Original) - Sent With Final Report  
Yellow - Chemical Testing Lab

Pink - ECLS Central File  
Gold - Sample Collector

**BFBM Biomonitoring Laboratory Macroinvertebrate Bench Sheet**

