

**NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
WATER MONITORING AND STANDARDS ELEMENT  
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, 2018**

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**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, 2018 – November, 2018

**4.0 Project Fiscal Information:** 7W106CXX

**5.0 Project Oversight:**

Project Officer- Thomas Miller, BFBM  
Project Supervisor- Dean Bryson, BFBM  
Project Data Manager- Leigh Lager, BFBM  
Quality Assurance Officer - Marc Ferko, NJDEP-OQA

**6.0 Special Training Needs/Certification**

Any personnel assisting with field sampling and/or laboratory processing of samples for this project will be trained on 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 processing, and performing habitat assessments and observations. Training in the laboratory will entail the proper sorting of a subsample. The Project Officer or Project Supervisor will be responsible for all necessary training.

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

BFBM is certified by the Office of Quality Assurance (certified lab ID # 11896) for all physical/chemical parameters to be measured.

**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). In addition to adequately assessing the major Water Regions, sites were also selected to represent and assess individual sub-watersheds (HUC 14 scale). The study area of the Northeast Water Region includes WMA's 3, 4, 5, and 6.

The spatial distribution of stations is adequate to provide biological impact data on a long-term, region-wide or statewide scale. It is likely not sufficient, however, to assess the biological impact(s) of any one point source of pollution, as this would be better served by a site-specific or intensive survey of the stream segment in question. The designated sampling

interval for AMNET, of five years, reflects a realistic temporal lag between cessation of an environmental perturbation and recovery of the impacted biological community.

The methodology is based on the Rapid Bioassessment Protocols (RBP), scientifically designed and validated under the auspices of the U. S. Environmental Protection Agency (USEPA, 1999).

The AMNET program was initiated in 1992. To date, five full rounds have been completed. Sampling of the Northeast Water Region in 2018 continues the sixth round of statewide AMNET monitoring.

Samples will also be collected at AMNET sites designated in this QAPP for the Biological Nutrient Correlation Project. Sample collection will take place during the AMNET sampling visit. Total Phosphorus and Total Nitrogen (calculated) samples will be collected. Project description and other details are defined in the QAPP for the Biological Nutrient Correlation Project.

### **7.1. Data Usage**

Data obtained will be used by NJDEP in the generation of the biennial Integrated Water Quality 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 report 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 Northeast Water Region now includes 108 active sites in the AMNET network (See Appendix A, Table 1). These sites were initially selected using a stratified approach to ensure complete and representative coverage of the Water Region. Enhancements to the network were instituted to include sites that best evaluate the sub-watersheds (HUC14 scale) of the Water Region for Aquatic Life Use attainment in the Integrated Water Quality Assessment Report.

Exact AMNET site locations were initially determined via the Global Positioning System (GPS) using a Trimble unit and the appropriate correction sources utilized by NJDEP. All positions were logged into the Geographic Information System (GIS). Hand-held GPS units, 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

Benthic macroinvertebrates will be sampled from each site focusing on the most productive habitats present at the site, as outlined in Rapid Bioassessment Protocols for Use in Streams and Rivers, Second edition (USEPA1999), and Standard Operating Procedures (SOP) For Ambient Biological Monitoring Using Benthic Macroinvertebrates (NJDEP 2007). A re-usable 800x900µm mesh D-frame dip net will be used to collect samples from the most productive habitats present in the stream. Sites in the Northeast Water Region are above the “Fall Line”, and therefore these rivers and streams are considered high gradient, with substrate consisting predominantly of cobble, and having riffle/run type habitat. For these high gradient streams, macroinvertebrate abundance and diversity is usually highest on cobble (riffle/run) habitats, which is therefore the focus of sampling. The sampler will use their feet and/or hands to dislodge organisms from these substrates, immediately upstream of the net, using current to carry into the net.

Approximately one liter of sample will be collected into a re-usable one-liter wide-mouth plastic container (thoroughly cleaned between uses) and preserved on site using a 5-10% formalin solution. Specimens fixed with formalin will remain preserved indefinitely. Each site in the Water Region will be sampled one time for the project, 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 wadeable 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 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, Subchapter 8 and NJDEP Field Sampling Procedures Manual (2005). 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 form for high 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 scores and rating will be presented along with the index score and rating. These habitat scores and ratings do not factor into the calculation of the index scores, but are collected as additional information in the assessment of sampling results, along with photographs and observations related to potential stressors.

## **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 a commercial disinfectant cleaner 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 Hydrolab MS5. The Hydrolab MS5 is a multi-parameter water quality meter that combines 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 N.J.A.C. 7:18 (NJDEP, as amended 2017). All calibration and water quality data will be recorded in a bound logbook.

**Conductivity:** 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. Records of all calibrations and calibration checks shall be maintained in the field log.

**Dissolved Oxygen:** A Winkler check is performed on a weekly basis and the meter is barometrically calibrated once on day of use. A calibration check 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 the field log

**pH:** The probe is calibrated daily with two certified buffers that bracket the expected range of the value being measured per the manufacturer's 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 the field log.

Temperature: The probe is calibrated with a NIST-certified thermometer on a quarterly basis. Records of the calibration shall be maintained by the BFBM.

Barometer: Thommen TX Mechanical Barometer.

Turbidity meter: Hach Model 2100Q turbidimeter is calibrated once a month per manufacturer recommendations. The meter is then checked with certified standards for accuracy within the calibration range during each day of use. Records of all calibrations and calibration checks shall be maintained in the field log.

### **Chain of Custody**

No chain of custody will be used. Results of this study will not be used for compliance or enforcement actions. 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). Only designated, experienced, staff will perform taxonomic identifications. 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. 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. Data from the duplicate identifications will be stored internally, with only the BFBM identifications being reported.

### **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 100x, 200x, 400x, and 1000x magnification will be used for very detailed identifying features. The biomonitoring laboratory currently uses Leica models DMLS (with phase contrast) and DME.

**12.0 Resource Needs:** BFBM will need one hourly staff to complete this project.

### **13.0 Sampling Schedule**

All sites in the Northeast Water Region will be sampled once during July 1<sup>st</sup>, 2018 and November 30, 2018, 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) will be used to assess all 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 whether or not 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.

### **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 also recorded electronically in a Microsoft Access database. All macroinvertebrate identifications will be recorded on the BFBM's Macroinvertebrate Laboratory Data Sheet and entered into a Microsoft Access database. Taxonomic data and counts, metric scores, index scores and ratings, habitat assessment scores and ratings, and analyze-immediately field parameters will be uploaded into NJDEP's Water Quality Data Exchange (WQDE) USEPA's water monitoring data repository and transferred to STORET(WQX). This data will also be available from the National Water Monitoring Council Water Quality Portal.

A data summary table, including index scores and ratings, will be posted on the BFBM website ([www.state.nj.us/dep/wms/bfbm](http://www.state.nj.us/dep/wms/bfbm)) after completion of all sample analyses for the Water Region and data validation.

Following the QA/QC validation of results, data will be entered into New Jersey's Water Quality Data Exchange (WQDE) and USEPA STORET Data Warehouse by June of the year following verification. 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	>=63
Good	42-<63
Fair	21-<42
Poor	<21

## 19.0 Corrective Action

The Project Officer will be responsible for the oversight of all 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. 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, 2005. Field sampling procedures manual. NJDEP, Trenton, NJ. 360pp.
- NJDEP, as amended November 6, 2017. 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**

For Data Management purposes, Water Chemistry is defined as parameters analyzed by a laboratory; Field measurements are defined as analyze-immediately parameters.

**Table 1 Site List**

<b>WMA</b>	<b>Station</b>	<b>Stream/Location</b>	<b>D-Longitude</b>	<b>D-Latitude</b>	<b>County</b>	<b>Site exists in WQDE already?</b>	<b>Location Type</b>
05	AN0205	Hackensack River @ Old Tappan Rd	Bergen	-74.008419013	41.012339886	Yes	River/Stream
05	AN0206	Musquapsink Bk @ Harrington Ave	Bergen	-74.023240738	40.992314953	Yes	River/Stream
05	AN0207A	Pascack Bk @ Westwood Ave/Demarest Ave	Bergen	-74.02572001	40.996641	Yes	River/Stream
05	AN0208	Dwars Kill @ end of Anderson Ave	Bergen	-73.934025562	40.976764684	Yes	River/Stream
05	AN0208A	Sparkill Bk @ off Union St	Bergen	-73.940279309	41.008223742	Yes	River/Stream
05	AN0209	Tenakill Bk @ Cedar La / Closter Dock	Bergen	-73.967308464	40.978508793	Yes	River/Stream
05	AN0210	Dorotockeys Run @ Tappan Rd	Bergen	-73.974820202	40.987483176	Yes	River/Stream
05	AN0210A	Hirshfeld Bk @ River Rd	Bergen	-74.020112338	40.947398874	Yes	River/Stream
05	AN0211	Van Saun Bk @ Main St & Rt 4	Bergen	-74.039994686	40.911106094	Yes	River/Stream
05	AN0212	Overpeck Ck @ Dean Dr	Bergen	-73.969141842	40.906654818	Yes	River/Stream
06	AN0213	Passaic River @ Tempe Wicke Rd	Morris	-74.569891358	40.771783205	Yes	River/Stream
06	AN0214	Indian Grave Bk @ Hardscrabble Rd N of Old Army Rd	Somerset	-74.551188304	40.741428413	Yes	River/Stream
06	AN0215	UNT to Primrose Bk @ Jockey Hollow Rd	Morris	-74.534001371	40.768237034	Yes	River/Stream
06	AN0215A	Primrose Bk @ Jockey Hollow Rd	Morris	-74.529646038	40.765042529	Yes	River/Stream
06	AN0216	Primrose Bk @ Lees Hill Rd / Madisonville	Morris	-74.515409706	40.728687434	Yes	River/Stream
06	AN0217	Catfish Brook (Silver Brook) @ Blackwells Place	Morris	-74.50625582	40.767834583	Yes	River/Stream
06	AN0218	Great Bk @ Blackberry Lane	Morris	-74.476920882	40.773497762	Yes	River/Stream
06	AN0219	Great Bk @ end of Woodland Rd	Morris	-74.474078396	40.725124055	Yes	River/Stream
06	AN0220	Loantaka Bk @ Bluestone Terrace	Morris	-74.46073616	40.771792715	Yes	River/Stream
06	AN0221	Loantaka Bk @ Green Village Rd	Morris	-74.44592342	40.738536765	Yes	River/Stream
06	AN0222	Black Bk @ Southern Blvd	Morris	-74.42274186	40.736869703	Yes	River/Stream

06	AN0223	Black Bk @ New Vernon Rd	Morris	-74.475921197	40.701217303	Yes	River/Stream
06	AN0224	Passaic River @ Passaic Valley Rd (Rt 512)	Morris & Somerset	-74.529686196	40.66477828	Yes	River/Stream
06	AN0226	Dead River @ off Somerville Rd	Somerset	-74.593094204	40.659296151	Yes	River/Stream
06	AN0227	Dead River @ King George Rd (Rt 651)	Somerset	-74.524206706	40.649738021	Yes	River/Stream
06	AN0227A	Harrison Bk @ off Valley Rd	Somerset	-74.574797217	40.65909006	Yes	River/Stream
06	AN0229	Passaic River @ Stanley Ave	Morris & Union	-74.389781694	40.726080226	Yes	River/Stream
06	AN0230	Passaic River @ Summit Ave Chatham Rd	Morris & Union	-74.37751649	40.734312876	Yes	River/Stream
06	AN0230B	UNT Passaic River @ Off Glenwood	Essex	-74.303279133	40.839587048	Yes	River/Stream
06	AN0231	Passaic River @ Eagle Rock Ave	Morris & Essex	-74.335080579	40.82762662	Yes	River/Stream
06	AN0231A	Passaic River @ Passaic Ave	Morris & Essex	-74.361335569	40.755787448	Yes	River/Stream
06	AN0231C	Slough Bk @ Parsonage Hill Rd	Essex	-74.349194107	40.758964476	Yes	River/Stream
06	AN0231D	Canoe Bk @ Parsonage Hill Rd	Essex	-74.336935198	40.74879846	Yes	River/Stream
06	AN0231E	Canoe Bk @ E. McClellan St	Essex	-74.298244727	40.801686751	Yes	River/Stream
06	AN0232	UNT to Whippany River (Dismal Bk) @ Mt Pleasant Rd	Morris	-74.5692688	40.812133077	Yes	River/Stream
06	AN0233	Whippany River @ Whitehead Rd	Morris	-74.529862885	40.796802444	Yes	River/Stream
06	AN0233A	Whippany River @ Lake Valley Rd	Morris	-74.497404812	40.812618602	Yes	River/Stream
06	AN0234	Whippany River @ Ridgedale Ave	Morris	-74.466283356	40.801365612	Yes	River/Stream
06	AN0234A	Watnong Bk @ Lake Rd	Morris	-74.49356981	40.814018906	Yes	River/Stream
06	AN0235	Whippany River @ Jefferson Rd	Morris	-74.440170055	40.819546374	Yes	River/Stream
06	AN0235A	Black Bk @ nr Ridgedale Ave and State Hwy 10	Morris	-74.394597199	40.810556014	Yes	River/Stream
06	AN0236	Troy Bk @ Lake Dr	Morris	-74.44470103	40.883085797	Yes	River/Stream
06	AN0237	Troy Bk @ Beverwyck Rd	Morris	-74.389878965	40.854404938	Yes	River/Stream
06	AN0238	Whippany River @ end of Edwards Rd	Morris	-74.347050107	40.845311277	Yes	River/Stream
06	AN0238B	Malapardis Bk @ Mt. Pleasant Ave	Morris	-74.419324237	40.823902042	Yes	River/Stream
06	AN0239	Russia Bk @ Milton-Dover Rd	Morris	-74.527554274	41.01972362	Yes	River/Stream

06	AN0239A	Russia Bk @ Russia Rd	Morris	-74.531478391	41.038615345	Yes	River/Stream
06	AN0241	Rockaway River @ Berkshire Valley Rd	Morris	-74.570762488	40.95421465	Yes	River/Stream
06	AN0242	Green Pond Bk @ Mt Pleasant Tpk & Rt 15	Morris	-74.567834248	40.904375064	Yes	River/Stream
06	AN0243	Rockaway River @ Rt 513 & E Blackwell Rd	Morris	-74.533490947	40.880273584	Yes	River/Stream
06	AN0244	Mill Bk @ Palmer Rd Franklin Rd	Morris	-74.525322568	40.878771434	Yes	River/Stream
06	AN0245	Beaver Bk @ Meriden Rd	Morris	-74.460312994	40.946959451	Yes	River/Stream
06	AN0245A	Hibernia Bk @ Meriden Rd	Morris	-74.48686037	40.930607313	Yes	River/Stream
06	AN0246	Beaver Bk @ Morris Ave	Morris	-74.497055753	40.906134408	Yes	River/Stream
06	AN0247	Den Bk @ Mt Pleasant Tpk	Morris	-74.51719501	40.868509551	Yes	River/Stream
06	AN0248	Rockaway River @ Pocono Rd at St Clair Hosp	Morris	-74.463124818	40.894367853	Yes	River/Stream
06	AN0249	Stony Bk @ Valley Rd	Morris	-74.437542184	40.928856037	Yes	River/Stream
06	AN0250	Rockaway River @ under Morris Ave	Morris	-74.409883503	40.902977385	Yes	River/Stream
06	AN0251	Rockaway River @ Green Bank Rd	Morris	-74.387854647	40.899435968	Yes	River/Stream
06	AN0252	Crooked Bk @ Hemlock Rd & Glen Terr	Morris	-74.371300971	40.938630018	Yes	River/Stream
06	AN0254	Crooked Bk @ River Rd	Morris	-74.373569118	40.890238846	Yes	River/Stream
03	AN0255	Wanaque River @ Fire Lane off E Shore Dr	Passaic	-74.316656223	41.163546622	Yes	River/Stream
03	AN0255D	Green Bk @ Union Valley Rd (Rt 513)	Passaic	-74.358973826	41.152738728	Yes	River/Stream
03	AN0255E	Belcher Ck @ Dockerty Hollow Rd	Passaic	-74.391755579	41.110034631	Yes	River/Stream
03	AN0256A	Meadow Bk @ Warren Hagstrom Blvd	Passaic	-74.28569156	41.04283378	Yes	River/Stream
03	AN0256B	Ringwood Ck @ park trail off of Margaret King Rd	Passaic	-74.265772252	41.127219894	Yes	River/Stream
03	AN0256C	West Bk @ Westbrook Rd	Passaic	-74.337314914	41.087161493	Yes	River/Stream
03	AN0257	Wanaque River @ Wanaque Ave	Passaic	-74.292141301	41.007349809	Yes	River/Stream
03	AN0258	Pequannock River @ Rt 515	Sussex	-74.513735735	41.115275726	Yes	River/Stream
03	AN0258A	Pacock Bk @ Canistear Rd	Passaic	-74.472352227	41.136506806	Yes	River/Stream

03	AN0259	Pequannock River @ Rt 23N nr Canistear Rd	Passaic & Morris	-74.489069869	41.078056076	Yes	River/Stream
03	AN0260	Mossmans Bk @ Clinton Rd N of Clinton Res	Passaic	-74.434378704	41.106934302	Yes	River/Stream
03	AN0261	Clinton Bk @ La Rue Rd	Passaic	-74.440464847	41.059702119	Yes	River/Stream
03	AN0262	Kanouse Bk @ Kanouse Rd	Passaic	-74.429585291	41.047433292	Yes	River/Stream
03	AN0263	Macopin River @ Echo Lake Rd	Passaic	-74.406076696	41.048266926	Yes	River/Stream
03	AN0264	Pequannock River @ Rt 23	Passaic & Morris	-74.401055934	41.018454395	Yes	River/Stream
03	AN0265	Pequannock River @ Main St (Rt 511)	Morris & Passaic	-74.33476944	41.003530488	Yes	River/Stream
03	AN0266	Ramapo River @ Rt 202 near Rt 17	Bergen	-74.165444168	41.096788621	Yes	River/Stream
03	AN0266C	Ramapo River @ off Rt 202	Bergen	-74.191431189	41.077424716	Yes	River/Stream
03	AN0266D	Bear Swamp Bk @ Bear Swamp and Deerhaven Rds	Bergen	-74.209202543	41.066617787	Yes	River/Stream
03	AN0266E	Mahwah River @ Brakeshoe Pl	Bergen	-74.155412583	41.104010841	Yes	River/Stream
03	AN0267	Ramapo River @ Lenape Lane	Bergen	-74.241268585	41.036670183	Yes	River/Stream
03	AN0267J	Pond Bk @ Rt 202 and Franklin Ave	Sussex	-74.236587299	41.029161816	Yes	River/Stream
03	AN0268	Pompton River @ Rt 504 Newark Pompton Tpk	Morris & Passaic	-74.279511033	40.94339792	Yes	River/Stream
03	AN0269	Dam Bk Trib to Pompton River @ Ryerson Rd	Morris	-74.293079113	40.926561701	Yes	River/Stream
03	AN0270	Packanack Bk @ Osbourne Rd	Passaic	-74.252785595	40.933028313	Yes	River/Stream
04	AN0271	Deepavaal Bk @ Little Falls Ave & Jane Rd	Essex	-74.266097538	40.887280839	Yes	River/Stream
04	AN0272	Preakness Bk (Singac Bk) @ Rt 504	Passaic	-74.225025871	40.958242761	Yes	River/Stream
04	AN0273	Preakness Bk @ Edison Dr	Passaic	-74.246716666	40.911566667	Yes	River/Stream
04	AN0274	Passaic River @ River View Dr	Passaic	-74.22333144	40.887571051	Yes	River/Stream
06	AN0274A	Passaic River @ end of Willard Lane	Morris & Essex	-74.336539034	40.900932235	Yes	River/Stream
04	AN0275	Peckman River @ McBride Ave	Passaic	-74.211479515	40.892054694	Yes	River/Stream
04	AN0275A	Peckman River @ Bradford Ave	Essex	-74.234232788	40.848217782	Yes	River/Stream

04	AN0276	Molly Ann Bk @ off Totowa Ave Bridge	Passaic	-74.190385658	40.914477228	Yes	River/Stream
04	AN0277	Goffle Bk @ Wagaraw Rd	Passaic	-74.162860984	40.938992136	Yes	River/Stream
04	AN0277A	Goffle Bk @ Wyckoff Ave	Bergen	-74.138754281	40.982320011	Yes	River/Stream
04	AN0278	Diamond Bk @ Harristown Rd	Bergen	-74.141962393	40.947808587	Yes	River/Stream
04	AN0281	Saddle R @ E Allendale Ave	Bergen	-74.100157782	41.031918684	Yes	River/Stream
04	AN0282	Saddle R @ E Ridgewood Ave	Bergen	-74.092441538	40.972601689	Yes	River/Stream
04	AN0283	Hohokus Bk @ Old Mill Rd	Bergen	-74.193595545	41.025957284	Yes	River/Stream
04	AN0285	Hohokus Bk @ Park Ave	Bergen	-74.13651979	41.024458959	Yes	River/Stream
04	AN0287	Ramsey Bk @ Park Ave	Bergen	-74.135976449	41.024975855	Yes	River/Stream
04	AN0288	Hohokus Bk @ Spring St	Bergen	-74.108508066	40.973523381	Yes	River/Stream
04	AN0289	Saddle R @ Dunkerhook Rd	Bergen	-74.098714525	40.94630814	Yes	River/Stream
04	AN0290	Saddle R @ Railroad Ave	Bergen	-74.081154258	40.903568556	Yes	River/Stream
04	AN0291	Saddle R @ Marsellus Place & Saddle River Ave	Bergen	-74.101564123	40.864088193	Yes	River/Stream
04	AN0292	Third River @ Kingland Rd	Passaic	-74.14164446	40.826627118	Yes	River/Stream
04	AN0292A	Third River @ W. Passaic Ave	Bergen & Passaic	-74.179589117	40.8334332	Yes	River/Stream

**Table 2 Sample Types**

STATION ID	Field Msr/Obs	Flow	Water Chemistry	Continuous Monitoring	Biological Sampling	Sediment Collection	Bacteria Collection	Habitat	Metrics	Indices
All Sites	YES	NO	NO	NO	YES	NO	NO	YES	YES	YES

**Table 3 Partners**

STATION ID	Field Msr/Obs	Flow	Water Chemistry	Continuous Monitoring	Biological Sampling	Sediment Collection	Bacteria Collection
All Sites	DEP	NO	NO	NO	DEP	NO	NO

**Table 4 Field Measures**

Field Name	WQDE Name	Media	Units
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 5 Habitat Assessment Parameters**

CODE	NAME	DESCRIPTION
HAB_0207	RBP2, High G, Bank Stability, Left Bank	RBP2, High G, Bank Stability, Left Bank (choice list)
HAB_0208	RBP2, High G, Bank Stability, Right Bank	RBP2, High G, Bank Stability, Right Bank (choice list)
HAB_0209	RBP2, High G, Channel Alteration	RBP2, High G, Channel Alteration (choice list)
HAB_0210	RBP2, High G, Channel Flow Status	RBP2, High G, Channel Flow Status (choice list)
HAB_0211	RBP2, High G, Embeddedness	RBP2, High G, Embeddedness (choice list)
HAB_0212	RBP2, High G, Epifaunal Substrate/Available Cover	RBP2, High G, Epifaunal Substrate/Available Cover (choice list)
HAB_0213	RBP2, High G, Frequency of Riffles (or bends)	RBP2, High G, Frequency of Riffles (or bends) (choice list)
HAB_0215	RBP2, High G, Riparian Vegetative Zone Width, Left Bank	RBP2, High G, Riparian Vegetative Zone Width, Left Bank (choice list)
HAB_0216	RBP2, High G, Riparian Vegetative Zone Width, Right Bank	RBP2, High G, Riparian Vegetative Zone Width, Right Bank (choice list)

HAB_0217	RBP2, High G, Sediment Deposition	RBP2, High G, Sediment Deposition (choice list)
HAB_0218	RBP2, High G, Vegetative Protection, Left Bank	RBP2, High G, Vegetative Protection, Left Bank (choice list)
HAB_0219	RBP2, High G, Vegetative Protection, Right Bank	RBP2, High G, Vegetative Protection, Right Bank (choice list)
HAB_0220	RBP2, High G, Velocity/Depth Regime	RBP2, High G, Velocity/Depth Regime (choice list)

**Table 6 Habitat Assessment Metrics**

CODE	NAME	DESCRIPTION
HAB_0214	RBP2, High G, habitat assessment total score	RBP2, High G, habitat assessment total score
HAB_0240	RBP2, High G, habitat assessment total rating	RBP2, High G, habitat assessment total rating

**Table 7 Individual Index Metrics**

CODE	NAME	DESCRIPTION
HGMIG_001	Total number of genera	Total number of genera
HGMIG_002	Percent of genera that are not insects	Percent of genera that are not insects
HGMIG_003	Percent of sensitive EPT individuals	Percent of sensitive EPT individuals
HGMIG_004	Number of scraper genera	Number of scraper genera
HGMIG_005	Number of attribute 2 genera	Number of attribute 2 genera
HGMIG_006	Number of attribute 3 genera	Number of attribute 3 genera

**Table 8 Overall Metrics**

CODE	NAME	DESCRIPTION
HGMIG	High Gradient Macroinvertebrate Index - genera	High Gradient Macroinvertebrate Index - genera
HGMIGR	HGMI - genera Rating	HGMI - genera Rating

**Table 9 Data Inventory Supplement**

<b>Geographic Regions</b>	Northeast Water Region
<b>Counties</b>	Bergen, Essex, Morris, Passaic, Somerset, Sussex, Union
<b>Dates</b>	July 1, 2018 - November 30, 2018
<b>Status</b>	In progress- discrete
<b>Sample Frequency</b>	Other- once
<b>Seasons Sampled</b>	Summer, Fall
<b>Waterbody Type</b>	River/Stream
<b>Salinity Category</b>	Fresh
<b>Tidal Influence</b>	Non-tidal
<b>Project Description</b>	Through sampling and analysis of macroinvertebrate communities at a network of freshwater, non-tidal rivers and streams sites, the biological condition of these waterbodies and watersheds in the Northeast Water Region is assessed.
<b>Parameters analyzed type</b>	Habitat; Biological- Benthic macroinvertebrates

**Table 10 Data Management Supplement**

QAPP network path file location?	V:\LUM\BFBM\Bfbm\Quality Assurance Plans\Calendar Year 2018 QAPPS\2018 AMNET QAPP-Northeast Region
Where will data be recorded in field (media)	Paper
If on tablets or phones, will download at office occur or will you connect wirelessly?	N/A
If on tablets or phones, who will do the download?	N/A
If data collected electronically, where will it be stored?	N/A
Format to be received from Lab	N/A
Method of receipt from lab/s	N/A
Personnel receiving outside lab data	N/A
Is data expected to go to WQDE/STORET?	Yes
Data manager - (Bureau and Name)	BFBM- Carol Kee