

Guidance for Biological Assessment Studies

as required by the



**New Jersey Department of Environmental Protection
Bureau of Point Source Permitting - Regions 1 & 2**

November 2001

A. General Information

The purpose of the Biological Assessment Study is to undergo a screening process to determine the biological impacts of a new or expanding surface water discharge on a receiving water body. A biological assessment will be conducted for all new or expanding discharges, with the exclusion of ground water remediation projects and dischargers to tidal water bodies.

In order to assess the biological impact of a discharger, it is essential that baseline data is collected and an associated report is submitted to the Department. Furthermore, additional follow-up data shall be collected after initiation of the new or expanding discharge. A follow-up final report shall be submitted to the Department. By comparing the baseline data to the follow-up data, the follow-up final report shall determine whether or not the new or expanding discharge has significantly affected the biology of the receiving stream. For the baseline and follow-up reports, the permittee is required to submit all data in both hardcopy and electronic (spreadsheet format) format. In addition, the data shall be submitted directly to EPA STORET (Storage and Retrieval) database, when possible.

At a minimum, the biological assessment study shall consist of benthic macroinvertebrate sampling and analysis. However, when necessary, the Department reserves the right to include additional biological sampling and analysis as part of the biosurvey (e.g. addressing threatened and endangered species).

At the request of the Bureau of Freshwater and Biological Monitoring, the Bureau of Points Source Permitting Regions 1 & 2 will not require fish sampling as part of the biological assessment study. However, as part of the study, the Department may require a biometric analysis on already existing data and/or data that is planned to be collected in the future. Communication should exist between the Bureau of Point Source Permitting Regions 1 & 2, the Bureau of Freshwater and Biological Monitoring, and the permittee with regards to previously collected fish data and/or the establishment of future sampling stations.

B) Biological Assessment and Quality Assurance/Quality Control workplan:

A Biological Assessment and Quality Assurance/Quality Control workplan shall be submitted and approved by the Department for both the baseline and follow-up sampling prior to the initiation of study sampling. The workplans shall be developed in accordance with the following documents:

- "EPA Requirements for QA Project Plans (QA/R-5)," EPA/240/B-01/003, March 2001, USEPA
- "Guidance for Quality Assurance Project Plans (QA/G-5)," EPA/600/BR-98/018, February, 1998, USEPA
- "Guidance for the Development of Quality Assurance Project Plans for Environmental Monitoring Projects," May, 1, 1999, US EPA Region 2

The Department would like to note that an additional document exists to use as reference for the development of the workplans. This document is titled "Guidance for Preparation of Combined Work/Quality Assurance Project Plans for Environmental Monitoring (OWRS QA-1)", May 1984, USEPA.

The permittee shall initiate quality control measures in accordance with the 1999 USEPA "Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers" (EPA-841-B-99-002) and the study workplan approved by the Department. As part of the taxonomic quality control measures for the study, the permittee has two (2) options:

Option #1: A reference collection of all samples and subsamples be maintained. The specimens should be properly labeled, preserved, and stored in the laboratory for future reference. Furthermore, a taxonomist not responsible for the original identifications should spot check samples corresponding to the identifications on the bench sheet.

Option #2: For each of the lowest taxons originally identified, one (1) specimen shall be verified by a second taxonomist. The results of this verification shall be reported in both the baseline and follow-up final reports.

C) Habitat Assessment:

The habitat assessment procedures and analysis shall be conducted in accordance with the 1999 USEPA “Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers” (EPA-841-B-99-002). The permittee shall utilize the following total score values to determine the appropriate habitat condition:

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

D) Physicochemical Sampling:

All physicochemical sampling procedures shall be conducted in accordance with the 1992 NJDEP “Field Sampling Procedures Manual”. Samples shall be obtained concurrent with biological sampling. The following parameters shall be addressed: pH, Temperature (°C), Dissolved Oxygen, Conductivity, Turbidity, Stream Channel Depth, Stream Channel Width, and Stream Velocity. The Department reserves the right to require additional physicochemical parameters (e.g. TDS) to be addressed during the biological study.

E) Biological Sampling:

All biological sampling procedures shall be conducted in accordance with the 1999 USEPA “Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers” (EPA-841-B-99-002) and/or the 1992 NJDEP “Field Sampling Procedures Manual”. Upon Departmental approval, biological sampling procedures may be conducted in accordance with the 1989 USEPA “Rapid Bioassessment Protocols for Use in Streams and Rivers” (EPA/440/4-89/001) or any other documented sampling procedures.

Temporal and Spatial Aspects:

The sampling frequency for non-degradation (i.e. category 1) or FW2-TM (category 2) streams shall be at least 2 times per year; once in the early summer and once during late August.

The sampling frequency for FW2-NT (category 2) streams shall be at least 1 time per year; either in the early summer or during late August.

Sampling stations will occur at a minimum of three (3) locations that are directly relate to the facilities point of discharge; upstream of the point of discharge, downstream in the zone of initial mixing, and downstream in the zone of recovery. Please note that additional sampling stations may be required depending on the stream characteristics and sampling accessibility.

Sampling shall be conducted in accordance with the multi-habitat approach, concentrated on the most productive habitat of the stream (i.e. the riffle/run areas when available), as specified by the 1999 USEPA “Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers” document. In addition to the specified sampling procedures, Coarse Particulate Organic Matter (CPOM) samples shall be collected, when possible, and composited with the other collected samples.

Before project design and initiation of the biological sampling, it may be beneficial for the permittee to review any existing data, or future plans to accumulate data, in the NJDEP Ambient Biomonitoring Network (AMNET). Using this information may relieve the permittee of some baseline or follow-up data collection. AMNET data can be located on the Bureau of Freshwater and Biological Monitoring's website at the following address: "<http://www.state.nj.us/dep/watershedmgt/bfbm/amnet.html>".

F) Benthic Macroinvertebrate Metric Analysis:

The data analysis techniques shall be the exact method utilized by the NJDEP Bureau of Freshwater and Biological Monitoring. The data analysis scheme uses five (5) biometrics to calculate the New Jersey Impairment Score (NJIS). Biometrics are predictable measures of the benthic community's response to stresses, such as changes in water quality or habitat degradation. Each biometric measures a different component of community structure and has a different range of sensitivity to pollution stress. Deficiency of any one biometric will not invalidate the entire approach. The five (5) biometrics, based on family-level taxonomy, that are used in assessing a NJIS score are Taxa Richness, % Contribution of the Dominant Family (%CDF), EPT index, % EPT, and Modified Family Biotic Index (FBI).

The Department has developed scoring criteria for screening water quality in the New Jersey. This criteria, based on a statewide reference condition, shall be used in the biological assessment process for surface water dischargers. The criteria can be located on the Bureau of Freshwater and Biological Monitoring website (www.state.nj.us/dep/watershedmgt/bfbm).

Below are the data analysis procedures used in assessing the biological impact of a discharger on the receiving stream:

1) Baseline Study:

- i) Determine the impairment score and classification for each station using the five (5) biometrics and scoring criteria.

2) Follow-up Study:

- i) Determine the impairment score and classification for each station using the five (5) biometrics and scoring criteria.
- ii) Compare the follow-up impairment scores and classifications to the baseline impairment scores and classifications.
- iii) **Goal:** To have no significant negative change between the impairment scores and classifications for each station.

In the event that the biometrics procedures used by the NJDEP Bureau of Freshwater and Biological Monitoring are updated or changed, the data analysis techniques in the Biological Assessment Study shall be reflective of the updates.

G) Fish Metric Analysis (if required):

The permittee shall utilize the fish data techniques used by the NJDEP Bureau of Freshwater and Biological Monitoring (BFBM). The principal BFBM evaluation mechanism utilizes the technical framework of the Index of Biotic Integrity (IBI). An IBI is an index that measures the health of a stream based on multiple attributes (also referred to as metrics) of the resident fish assemblage. The BFBM employs the ten (10) metrics listed below:

- Metric 1: Total number of fish species.
Metric 2: Number and identity of benthic insectivorous species.
Metric 3: Number and identity of trout and/or sunfish species.
Metric 4: Number and identity of intolerant species.
Metric 5: Proportion of individuals as white suckers.
Metric 6: Proportion of individuals as generalists.
Metric 7: Proportion of individuals as insectivorous cyprinids.
Metric 8: Proportion of individuals as trout or proportion of individuals as piscivores (top carnivores) – excluding American Eel.
Metric 9: Number of individuals in the sample.
Metric 10: Proportion of individuals with disease, tumors, fin damage, and skeletal anomalies.

H) Submission of Workplans and Final Reports:

The table below outlines the NJDEP personnel in which the baseline and follow-up workplans and reports shall be submitted.

NJDEP Representative	Baseline Workplan	Baseline Report	Follow-up Workplan	Follow-up Report
Jason Lonardo NJDEP: Division of Water Quality Bureau of Point Source Permitting – Region 1 P.O. Box 029 Trenton, NJ 08625	X (1)	X (1)	X (1)	X (1)
BPSP Case Manager NJDEP: Division of Water Quality Bureau of Point Source Permitting P.O. Box 029 Trenton, NJ 08625	X	X	X	X
Marc Ferko NJDEP: Division of Environmental Safety, Health & Analytical Programs Office of Quality Assurance P.O. Box 424 Trenton, NJ 08625	X (1)		X (1)	
Nancy Immesberger NJDEP: Division of Science, Research & Technology P.O. Box 409 Trenton, NJ 08625		X		X

Footnote:

(1) NJDEP Approval Required

Reference Materials

- Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition*. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C. (also available on the internet at <http://www.epa.gov/ceisweb1/ceishome/atlas/bioindicators/rapidbioprotocol.html>)
- Barbour, M.T., S.K. Gross, R.M. Hughes, J.L. Plafkin, and K.D. Porter. 1989. *Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish*. EPA/444/4-89/001. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.
- New Jersey Department of Environmental Protection (NJDEP). 2001. Bureau of Freshwater and Biological Monitoring, Rapid Bioassessment Protocol. *Internet*: <http://www.state.nj.us/dep/watershedmgt/bfbm/rbpinfo.html>.
- New Jersey Department of Environmental Protection (NJDEP). 2001. Bureau of Freshwater and Biological Monitoring, Stream Habitat Assessment Forms. *Internet*: <http://www.state.nj.us/dep/watershedmgt/bfbm/rbpinfo.html>.
- New Jersey Department of Environmental Protection (NJDEP), 1992. *Field Sampling Procedures Manual*
- U.S. Environmental Protection Agency, 1984. *Guidance for Preparation of Combined Work/Quality Assurance Project Plans for Environmental Monitoring (OWRS QA-1)*, Office of Water Regulations and Standards.
- U.S. Environmental Protection Agency, 1995. *Generic Quality Assurance Project Plan Guidance for Programs Using Community Level Biological Assessment in Wadeable Streams and Rivers*, EPA 841/B-95/004.
- U.S. Environmental Protection Agency, 1998. *Guidance for Quality Assurance Project Plans (QA/G-5)*, EPA/600/R-98/018, Office of Research and Development. (also available on the internet at http://www.epa.gov/quality/qa_docs.html)
- U.S. Environmental Protection Agency Region II, 1999. *Guidance for the Development of Quality Assurance Project Plans for Environmental Monitoring Projects*.
- U.S. Environmental Protection Agency, 2000. *EPA Requirements for Quality Assurance Project Plans (QA/R-5)*, EPA/240/B-01/003, Office of Environmental Information. (also available on the internet at http://www.epa.gov/quality/qa_docs.html)