

## Guidance for Understanding a Biomonitoring Wetland Macroinvertebrate Aquatic Life Classification Attainment Report

The ME DEP Biological Monitoring Program generates a Macroinvertebrate Aquatic Life Classification Attainment Report for each wetland macroinvertebrate sampling event. This ‘Key’ Report contains many attributes about the biological sample as well as any physical and chemical data collected in conjunction with the biological sampling. This document takes a representative Macroinvertebrate Aquatic Life Classification Attainment report and attempts to explain items from each section that may not be self-explanatory. See the Sampling and Analysis page of the Biomonitoring website for more details on our sampling methods (<http://www.maine.gov/dep/water/monitoring/biomonitoring/sampling/index.htm>). These reports can be found in the Biomonitoring Google Earth project by clicking on a station and then selecting the desired report from the ‘Report’ column. Access our Google Earth project through the Data and Maps page of our website (<http://www.maine.gov/dep/water/monitoring/biomonitoring/data.htm>).

	<b>Maine Department of Environmental Protection Biological Monitoring Program Wetland Aquatic Life Classification Attainment Report</b>	
<b>Station Information</b>		
<b>Station Number:</b> W-142	<b>Trip ID</b> 2006-142	<b>DEP Drainage:</b> Penobscot
<b>Waterbody:</b> FRENCH STREAM		<b>HUC8:</b> 01020005
<b>Town:</b> Exeter		<b>HUC8 Name:</b> Lower Penobscot
		<b>Latitude:</b> 44 57 8.65 N
		<b>Longitude:</b> 69 8 22.1 W
		<b>Mitigation Monitoring Site:</b> No

The **Station Information** section contains a basic description of the station’s location.

- **Trip ID** – Unique identifier assigned to each site visit (year sampled – station number).
- **DEP Drainage:** This is the name of the 4-digit hydrologic unit code.
- **HUC8 (Hydrologic Unit Code) – HUC8 refers to the U.S. Geological Survey (USGS) 8-digit hydrologic unit code.** The United States is divided and sub-divided into nested hydrologic units by the USGS using a nationwide numeric coding system. Two-digit codes (HUC2) are assigned to the largest hydrologic units. Successively smaller hydrologic units are designated by 4-digit (HUC4), 6-digit (HUC6), 8-digit (HUC8), 10-digit (HUC10) and 12-digit (HUC12) codes. Additional information on the USGS HUC system may be found at <http://water.usgs.gov/GIS/huc.html>.
- **Latitude** and **Longitude** are projected in NAD83, meters.
- **Mitigation Monitoring Site** – Indicates if the wetland has been created, restored, enhanced or preserved as part of a compensatory mitigation plan required by a DEP issued wetland alteration permit.

<b>Sample Information</b>		
<b>Sample ID:</b> DN-2006-142	<b>Type of Sample:</b> DIPNET	<b>Date Sampled:</b> 6/20/2006
<b>Subsample Factor:</b> X1	<b>Replicates:</b> 3	

The **Sample Information** section contains information about the macroinvertebrate sample.

- **Sample ID** – Unique identifier assigned to each biological sample, representing the sample method, the year sampled and the station number. “DN” Indicates that this macroinvertebrate sample was collected using the Dipnet measured sweep method.
- **Subsample factor** – The inverse of the fraction of the sample identified by the taxonomist. Only a portion of the sample is identified when the number of organisms exceeds established criteria. For example, a subsampling factor of 4 means that the taxonomist selected ¼ of the sample, using protocols established in the Methods Manual, identified and counted the organisms in that subsample, and then multiplied the counts by 4. The example above has a subsampling factor of X1, indicating that the sample was not subsampled. The Biomonitoring methods manual, "Methods for Biological Sampling and Analysis of Maine's Rivers and Streams" (DEP LW0387–B2002), can be found here: <http://www.maine.gov/dep/water/monitoring/biomonitoring/materials/finlmeth1.pdf>, and is subsequently referred to throughout this document as the Methods Manual.
- **Replicates** – Usually, 3 replicate samples are collected during a sampling event. Very rarely, less than 3 replicates are collected.

Classification Attainment			
Statutory Class:	B	Final Determination:	A
Model Result with P>.6:	A	Reason for Determination:	Model
Date Last Calculated:	12/3/2012	Comments:	
		Date:	1/14/2013

The **Classification Attainment** section contains information about the statutory class, model results, and final determination

- **Statutory Class** – Water classification assigned by the Maine Legislature, consisting of designated uses, numeric criteria, and specific limitation on certain activities. If a water body is meeting all of its classification standards, it is attaining its class. See the Classification of Maine Waters page on the DEP’s website for more information (<http://www.maine.gov/dep/water/monitoring/classification/index.htm>).
- **Model Results with P>0.6** – The Class listed here is the aquatic life classification attainment predicted by the DEP’s linear discriminant statistical model (LDM). The “P” refers to the probability of attaining a class. For the example above, the site has a greater than 60% probability of attaining class A.
- **Date Last Calculated** – Date sample was analyzed with the statistical model.
- **Final Determination** – The aquatic life classification attained, as determined by a qualified DEP biologist using DEP's statistical model and/or Best Professional Judgment (BPJ).
- **Reason for Determination** – Method used to assign the Final Determination (Model or BPJ). Rarely but under certain circumstances, DEP Biologists may adjust the Final Determination based on analytical, biological and habitat information, that may result in a Final Determination that is not consistent with the Model Result.
- **Comments** – Explanation of why the Final Determination does not match the Model Result, if applicable.
- **Date** – Date Final Determination was made.

Model Probabilities			
Class A:	0.90	Class B:	0.10
Class C:	0.00	NA:	0.00

## Model Probabilities

DEP uses a linear discriminant model based on quantitative ecological attributes of the macroinvertebrate community to determine the strength of the association of a test community to any of the water quality classes (Class A, B, or C). The model uses the variables below, which reflect the diversity and sensitivity of the macroinvertebrate community, to determine the probabilities that a site attains one of three classes (A, B, or C) or is in non-attainment (NA) of the minimum criteria for any class. These probabilities have a possible range from 0.0 to 1.0.

The model may also come out with the model result Indeterminate (I). **Indeterminate** is a term that describes a probability value for a class of greater than 0.4 but less than 0.6 so that the conclusion of classification attainment for that class cannot be determined without further information. In this case the DEP Biologist may use their best professional judgment in order to make a final determination.

Model Variables			
Total Mean Abundance	590	MTI Sensitive Taxa Abundance	127.67
Ephemeroptera Abundance	60.00	MTI Sensitive Taxa Relative Abundance	0.22
Odonata Relative Abundance	0.005	MTI Sensitive Taxa Richness	11
Trichoptera Relative Abundance	0.002	MTI Intermediate Taxa Relative Abundance	0.76
Shredder Taxa Relative Abundance	0.01	MTI Intermediate Taxa Richness	23
Non-insect Taxa Relative Richness	0.24	Ratio of MTI Sensitive to Eurytopic Taxa Abundance	11.61
Other Variables		Five Most Dominant Taxa	
Generic Richness:	51	Rank	Taxon Name
Hilsenhoff Biotic Index:	7.08	1	<i>Tanytarsus</i>
Shannon-Weiner Diversity:	3.56	2	<i>Ammicola</i>
Maine Tolerance Index:	25.18	3	<i>Paratendipes</i>
		4	<i>Caenis</i>
		5	<i>Procladius</i>
			Percent
			34.01
			9.94
			9.49
			8.76
			7.57

## Model Variables and Other Variables

- **Total Mean Abundance** – The mean number of individuals in a sample, usually based on 3 replicates. It is used as a basic measure of community structure.
- **Relative Abundance**– The mean number of individuals from one taxonomic grouping divided by the total mean abundance for the whole sample
- **Generic Richness** – Generic richness is the total number of unique genera in a sample. In the example above, the total Generic Richness for the sample is 51. Generic Richness is a good measure of water quality, it will decline as water quality declines.
- **Relative Richness** – This is calculated by dividing a taxonomic group's richness by the sample's total generic richness.
- **Ephemeroptera Abundance**- Total number of Ephemeroptera (Mayfly) individuals. Mayflies are intolerant of many pollutants, so abundances are distinctly lower for nonattainment samples than the other classes.
- **Odonata Relative Abundance**- The relative abundance of organisms in the Odonata (dragonfly/damselfly) order.
- **Trichoptera Relative Abundance**- The relative abundance of organisms in the Trichoptera (Caddisfly) order. Many Trichoptera are intolerant of low water quality.

- **Shredder Taxa Relative Abundance**- The relative abundance of taxa in the functional feeding group shredders.
- **Non-Insect Taxa Relative Richness**- The relative richness of non-insect taxa.
- **MTI Sensitive Taxa Abundance**- The total number of sensitive taxa. Sensitive taxa determined using the Maine Tolerance Index (MTI).
- **MTI Sensitive Taxa Relative Abundance**- The relative abundance of sensitive taxa.
- **MTI Sensitive Taxa Richness**- the richness of sensitive taxa.
- **MTI Intermediate Taxa Relative Abundance**- The relative abundance of intermediate taxa. Intermediate taxa determined using the MTI.
- **MTI Intermediate Taxa Richness**- The richness of intermediate taxa.
- **Ratio of MTI Sensitive to Eurytopic Taxa Abundance**- The ratio of sensitive taxa to eurytopic taxa based on individual taxa tolerance values calculated for the MTI.
- **Hilsenhoff Biotic Index** (Hilsenhoff 1987.) – The Hilsenhoff biotic index provides a measure of the general tolerance level of the sample community toward organic (nutrient) enrichment. The index ranges from 0 (no apparent organic pollution) to 10 (severe organic pollution).
- **Shannon–Wiener Diversity** (Shannon and Weaver 1963.) – Shannon-Wiener Diversity is composed of a richness factor and an evenness factor. As both diversity and richness decline, the stability of most natural communities usually declines. Generally, the lower the number, the less stable the community is. Values can range from 0 to 4.6 but are usually between 1.5 and 3.5.
- **Maine Tolerance Index (MTI)** – Tolerance values for individual taxa are calculated using species optima (the predicted “preferred” environmental conditions for each taxon), on a scale from 1-100. Organisms with a tolerance value less than or equal to 22.0 are considered sensitive taxa. Organisms with a tolerance value between 22.1 and 42.9 are considered Intermediate taxa. And organisms with a tolerance value equal to or greater than 43.0 are considered Eurytopic taxa (taxa that occur across a wide range of environmental conditions). The MTI is a weighted average of tolerance values of the organisms found in the sample.

For more information about the specific macroinvertebrates and their ecology, see the Benthic Macroinvertebrate page of the Biomonitoring website.

(<http://www.maine.gov/dep/water/monitoring/biomonitoring/sampling/bugs/index.htm>).

**Five Most Dominant Taxa** – List of the top 5 most abundant taxa found in the sample and their percentage of the sample’s total abundance.

<b>Sample Collection and Processing Information</b>	
Sampling Organization:	BIOMONITORING UNIT
Taxonomist:	LOTIC INC.

**Sample Collection and Processing Information**

- **Sampling Organization** – Sampling must be performed by persons who can demonstrate their qualifications and ability to carry out the department's sampling protocol set forth in the Methods Manual and is usually done by the Biomonitoring Unit. Occasionally the department may also require monitoring as a condition of any license, permit or certification that it issues. Such monitoring must be conducted according to a quality

management plan provided to, and approved by, the department. This field shows the name of the sampling organization, agency or person.

- **Taxonomist** – Sample taxonomy for macroinvertebrates must be performed or supervised by a professional freshwater macroinvertebrate taxonomist who has the qualifications specified in the Methods Manual and is certified by the Society for Freshwater Science in the identification of eastern taxa. This field shows the name of the organization performing the taxonomy for the sample.

 <b>Maine Department of Environmental Protection Biological Monitoring Program Wetland Aquatic Life Classification Attainment Report</b>					
Water Chemistry					
<b>Sample Date:</b> 6/20/2006 12:45:00 PM					
Sample Type	Collection Method	Parameter	Value	Units	Qualifier
Surface Water	Grab Sample	Chlorophyll A	0.0027	mg/l	
Surface Water	Grab Sample	Chlorophyll A - Phaeophytin	0.0024	mg/l	
Surface Water	Grab Sample	Dissolved Organic Carbon	4.6	mg/l	
Surface Water	Grab Sample	Nitrate+nitrite As N	0.22	mg/l	
Surface Water	Grab Sample	pH	7.9		
Surface Water	Grab Sample	Silica	2.6	mg/l	
Surface Water	Grab Sample	Soluble Reactive Phosphorus	0.001	mg/l	
Surface Water	Grab Sample	Specific Conductance	194	us/cm	
Surface Water	Grab Sample	Total Alkalinity	84	mg/l	
Surface Water	Grab Sample	Total Kjeldahl Nitrogen	0.5	mg/l	
Surface Water	Grab Sample	Total Phosphorus	0.017	mg/l	
Surface Water	Grab Sample	True Color	24	unit	
Surface Water	In-situ	Dissolved Oxygen	7.5	mg/l	
Surface Water	In-situ	pH	7.55		
Surface Water	In-situ	Specific Conductance	176	us/cm	
Surface Water	In-situ	Temperature	24.1	deg c	

Physical/chemical characteristics of the water body including temperature, dissolved oxygen, pH and specific conductance are measured in the field at the time macroinvertebrate sampling is performed. Water grab samples are also collected and analyzed for a suite of water quality parameters by an outside laboratory. Common qualifiers are: J= Associated value is estimated, U= Not detected above the associated quantitation limit, NAN= Not analyzed.

See SOPs for procedures:

(<http://www.maine.gov/dep/water/monitoring/biomonitoring/material.html#QAandSOPs>)

Summary of Habitat Characteristics			
<u>Human Disturbance</u>	<u>Landscape-level Cowardin Classification</u>		<u>Hydrogeomorphic Setting</u>
Total Score:	10	System: PALUSTRINE	Landscape Position: LOTIC STREAM
Hydrologic Modifications:	2	Subsystem	Lotic Gradient: DAMMED REACH
Vegetative Modifications:	0	Class 1: UNCONSOLIDATED BOTTOM	Flow Path: THROUGHFLOW
Chemical Contaminants:	0	Subclass 1 MUD	Land Form: FRINGE
Impervious Surface:	4	Class 2: UNCONSOLIDATED BOTTOM	Land Form Type: LOTIC STREAM FRINGE POND
Non-point Sources:	4	Subclass 2 ORGANIC	Waterbody Type: POND
		Class 3:	Waterbody Subtype: DAMMED/IMPOUNDED
		Subclass 3:	Comments:
Dominant Plant Species:	PICKERELWEED, YELLOW WATER LILY, POTAMOGETON SP., BULL RUSH, VALLISNERIA		
Habitat Classification:	EMERGENT NON-PERSISTENT VEGETATION		Substrate Classification: DETRITUS SUBSTRATE SILT/MUCK SUBSTRATE

**Summary of Habitat Characteristics** contains information about the area surrounding the sample station.

- **Human Disturbance** – A field based stressor assessment based on the five categories listed above. A lower score indicates less human disturbance, and higher score indicative of more disturbance.

The ME DEP uses two wetland classification systems, both developed by the US Fish and Wildlife Service’s National Wetland Inventory (NWI) Program, to characterize the wetland area surrounding our sampling station from a landscape level perspective. Please note that the wetland classification for the actual location sampled is recorded in the field, and often varies from the landscape classification due to differences in scale.

- **Landscape-level Cowardin Classification** – Characterization of the site using the Cowardin wetland classification system. This system uses vegetation, substrate and hydrology to describe wetland types for inventory purposes. (Cowardin et. al., 1979)
- **Hydrogeomorphic (HGM) Setting** – The US Army Corp of Engineers (ACOE) has developed a HGM classification system (Brinson, 1993) which uses the wetland’s watershed position, its sources of water and its hydrodynamics to evaluate its functions. The NWI program has developed a HGM-type coding system (Tiner, 2003) to complement the Cowardin classification, which is the system used by the MEDEP.
- **Dominant Plant Species** – General overview of the dominant and/or commonly observed plants seen at the station, not a comprehensive list of all species present.
- **Habitat Classification** – Type of habitat immediately surrounding where macroinvertebrate samples were collected. See Wetland field sheet for the list of possible habitat types ([http://www.maine.gov/dep/water/monitoring/biomonitoring/materials/fieldsheet\\_wetlands.pdf](http://www.maine.gov/dep/water/monitoring/biomonitoring/materials/fieldsheet_wetlands.pdf)).
- **Substrate Classification** – Type of substrate found where macroinvertebrate samples were collected. See Wetland field sheet for the list of possible substrate types ([http://www.maine.gov/dep/water/monitoring/biomonitoring/materials/fieldsheet\\_wetlands.pdf](http://www.maine.gov/dep/water/monitoring/biomonitoring/materials/fieldsheet_wetlands.pdf)).



**Maine Department of Environmental Protection  
Biological Monitoring Program  
Wetland Aquatic Life Classification Attainment Report**

Landcover Summary - 2004 Data							
Total Area (ac)	10381	High Int. Dev. %	0.0	Water %	0.4	Non-vegetated %	0.0
		Med Int. Dev. %	0.1	Wetland %	4.3	Tilled Agriculture %	13.3
		Low Int. Dev. %	3.6	Upland Woody %	73.0	Grassland %	5.2
		Development %	3.7	Natural %	77.5	Human Altered %	22.1
						Impervious %	1.8
Total Land (ac)	10339	High Int. Dev. %	0.0	Water %	N/A	Non-vegetated %	N/A
		Med Int. Dev. %	0.1	Wetland %	4.4	Tilled Agriculture %	13.4
		Low Int. Dev. %	3.6	Upland Woody %	73.3	Grassland %	5.2
		Development %	3.7	Natural %	77.8	Human Altered %	22.2
						Impervious %	1.8

Land used calculations are based on 2004 Maine Land Cover Data (MELCD). MELCD is a land cover map for Maine primarily derived from Landsat Thematic Mapper 5 and 7 imagery. This imagery constitutes the basis for the National Land Cover Dataset (NLCD 2001) and the NOAA Coastal Change Analysis Program (C-CAP). This land cover map was refined to the State of Maine requirements using SPOT 5 panchromatic imagery from 2004. For more information on these land cover layers and how each category is calculated, contact the ME DEP GIS Unit (<http://www.maine.gov/dep/gis/datamaps>) or the ME Office of GIS (<http://megis.maine.gov/>).

- **Total Area**– includes land, open water, and mudflats
- **Total Land** – total area minus open water and mudflats
- **High Int. Dev.** – High Intensity Developed
- **Med Int. Dev.** – Medium Intensity Developed
- **Low Int. Dev.** – Low Intensity Developed
- **Development** – total of high, medium and low development and roads/runways
- **Water** – open water
- **Wetland** – wetlands, including forested wetlands
- **Upland woody** – total of all forest types except forested wetlands, including recent clear cuts and partially cut lands
- **Natural** – total land area minus the human altered land category (see below)
- **Non-vegetated** – unconsolidated shores and bare land, mostly gravel pits but also rocky mountain tops, mud flats, beaches and rocky shoreline
- **Tilled Agriculture** – cultivated crops
- **Grassland** – unmanaged grasslands
- **Human Altered** –total of all the developed classes, road/runways, all agriculture classes and bare lands (which are mostly gravel pits)
- **Impervious** – The impervious data set was derived from 5 meter SPOT imagery collected in the summer of 2004 over the State of Maine. The impervious data set is part of a larger mapping initiative by the State of Maine to quantify land cover at a 5 meter resolution over the entire state. Areas of imperviousness are characterized by anthropogenic features such as buildings, roads, parking lots, etc.



**Maine Department of Environmental Protection  
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**Additional Summary Variables**

Station Number: W-142	Waterbody: FRENCH STREAM	Town: Exeter
Log Number: DN-2006-142	Subsample Factor: X1	Replicates: 3
		Calculated: 12/3/2012

	Abundance	Relative Abundance	Richness	Relative Richness
EOT Taxa:	64.00	0.108	12	0.24
EPT Taxa:	61.33	0.104	8	0.16
Insects:	459.00	0.778	39	0.76
Non-Insects:	131.00	0.222	12	0.24
Leeches:	4.33	0.007	1	0.02
Oligochaetes:	1.33	0.002	1	0.02
Snails:	89.33	0.151	6	0.12
Bivalves:	1.00	0.002	1	0.02
Isopods:	0.00	0.000	0	0.00
Amphipods:	34.33	0.058	1	0.02
Mites:	0.67	0.001	2	0.04
Stoneflies:	0.00	0.000	0	0.00
Mayflies:	60.00	0.102	5	0.10
Odonates:	2.67	0.005	4	0.08
Caddisflies:	1.33	0.002	3	0.06
Diptera:	390.67	0.662	22	0.43
Hemiptera:	2.67	0.005	1	0.02
Beetles:	1.67	0.003	4	0.08
Chironomids:	383.33	0.650	18	0.35
Tanypodinae Tribe:	70.67	0.120	4	0.08
Chironomiinae Tribe:	306.00	0.519	11	0.22
Orthocloidiinae Tribe:	6.67	0.011	3	0.06
Collector-Filterers:	203.00	0.344	3	0.06
Collector-Gatherers:	187.33	0.318	12	0.24
Predators:	82.67	0.140	9	0.18
Piercers:	1.33	0.002	2	0.04
Shredders:	8.67	0.015	4	0.08
Scrapers:	86.91	0.147	4	0.08
Maine Tolerance:				
Sensitive:	127.67	0.221	11	0.28
Intermediate:	439.67	0.760	23	0.59
Eurytopic:	11.00	0.019	5	0.13
Ratio of MTI Sensitive to Eurytopic	11.61	11.606	2.20	2.20

The **Additional Summary Variables** section contains abundance, relative abundance, richness and relative richness information for a variety of taxonomic and functional feeding groups.

**EOT Taxa-** The total number of individuals in the orders Ephemeroptera (E), Odonata (O), and Trichoptera (T).

**EPT Taxa-** The total number of individuals in the orders Ephemeroptera (E), Plecoptera (P), and Trichoptera (T). These orders are usually poorly represented in communities where water quality is poor.

**MTI** –Maine tolerance Index (see definition in Model Variable and Other Variables section)

**Ratio of MTI Sensitive to Eurytopic-** See definition in Model Variable and Other Variables section

For more information about the specific macroinvertebrates and their ecology, see the Benthic Macroinvertebrate page of the Biomonitoring website:

<http://www.maine.gov/dep/water/monitoring/biomonitoring/sampling/bugs/index.htm>

 <b>Maine Department of Environmental Protection Biological Monitoring Program Wetland Aquatic Life Classification Attainment Report</b>								
<b>Aquatic Life Taxonomic Inventory Report</b>								
<b>Station Number: W-142</b>		<b>Waterbody: FRENCH STREAM</b>			<b>Town: Exeter</b>			
<b>Log Number: DN-2006-142</b>		<b>Subsample Factor: X1</b>		<b>Replicates: 3</b>		<b>Calculated: 12/3/2012</b>		
Taxon	Maine Taxonomic Code	Count (Mean of Samples)		Hilsenhoff Biotic Index	Functional Feeding Group	Maine Tolerance Index	Tribe	Taxa Group
		Actual	Adjusted					
<i>Lumbriculus</i>	08020101002	1.33	1.33	--	CG	35	--	Worm
<i>Helobdella</i>	08030101005	0.00	4.33	--	--	43	--	Leech
<i>Helobdella elongata</i>	08030101005001	0.67	0.00	--	--	--	--	Leech
<i>Helobdella stagnalis</i>	08030101005004	3.67	0.00	--	--	--	--	Leech
<i>Hyaella</i>	09010203006	34.33	34.33	8	CG	24.5	--	Amphipod
Aeshnidae	09020301	0.33	0.33	--	--	--	--	Dragonfly/damsefly
Libellulidae	09020306	1.67	1.67	--	--	--	--	Dragonfly/damsefly
<i>Libellula</i>	09020306035	0.33	0.33	9	PR	15	--	Dragonfly/damsefly
<i>Ischnura</i>	09020309052	0.33	0.33	9	PR	14.6	--	Dragonfly/damsefly
<i>Callibaetis</i>	09020401002	4.67	4.67	9	CG	40.5	--	Mayfly
<i>Procladius</i>	09020401010	3.00	3.00	--	CG	21	--	Mayfly

The **Aquatic Life Taxonomic Inventory Report** section is a list of all taxa found in the sample with some additional information described below.

- **Maine Taxonomic Code** – The Biomonitoring Unit use a hierarchical coding system to assign unique numeric identifiers to each taxa in our database.
- **Actual Mean count**– Calculated independently for each taxon by adding the number of individuals from each replicate and dividing by the number of replicates. For example, there was three individuals of *Helobdella elongata* in the three samplers, which makes the actual count 0.67 [(0+ 2 + 0) / 3 = 0.67]. Note that for taxa that are only observed in the pupal stage, no actual mean count is shown as pupae are excluded from model calculations.
- **Adjusted Mean count** – The LDM uses the adjusted counts that have been aggregated to the genus level. The mean abundances of all species are transferred to the corresponding genus. For example, this sample had two species in the genus *Helobdella*. The mean abundance counts for *Helobdella elongata* and *Helobdella stagnalis* were 0.67 and 3.67. The species counts were adjusted to genus by adding them together [0.67+3.67=4.33]. In some circumstances, counts of taxa at the family or order level are also aggregated to the genus level. See the Methods Manual for a detailed description of applying the counting rules. Note that for taxa that are only observed in the pupal stage, no actual mean count is shown as pupae are excluded from model calculations.

- **Hilsenhoff Biotic Index** (Hilsenhoff 1987.) – The biotic index provides a measure of the general tolerance level of the sample community toward organic (nutrient) enrichment. The index ranges from 0 (no apparent organic pollution) to 10 (severe organic pollution).
- **Functional Feeding Group** – Aquatic invertebrates can be grouped into groups according to how and what they eat:
  - Collector–filterers (CF) strain particles out of flowing water with brushes or nets.
  - Collector–gatherers (CG) are opportunistic omnivores that feed on whatever is easiest to find, using a variety of feeding methods.
  - Piercers (P) are organisms that obtain nourishment by piercing plant or animal tissue and sucking fluids.
  - Predators (PR) are carnivores that hunt and eat other organisms.
  - Scrapers (SC) remove algae, bacteria and fungus growing on the surface of rocks, twigs and leaf debris.
  - Shredders (SH) chew on coarse leaves and twigs that have started to decay to obtain nourishment from associated fungi, bacteria and other organic material.
- **Tribe** – One or more genera that share certain characteristics are placed into tribes. In the MDEP taxa list, usually only members of the Chironomidae family have their tribes noted. ‘T’ indicates that the corresponding taxa is in the Tanypodinae tribe, ‘O’ for the Orthoclaadiinae Tribe, ‘C’ for the Chironominae-Chironomini Tribe, ‘D’ for the Diamesinae Tribe, ‘P’ for the Podonominae Tribe, ‘R’ for the Prodiamesinae Tribe, ‘Y’ for the Chironominae-Tanytarsini Tribe, ‘S’ for the Chironominae-Pseudochironomini Tribe, and ‘H’ for the Chironominae Tribe.
- **Taxa Group**- Group common name

## References

Brinson, M.M. 1993. A Hydrogeomorphic Classification for Wetlands. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS, USA. [Technical Report WRP- DE-4](#).

Cowardin, L.M., Carter, V., Golet, F.C., and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31.

Tiner, R. 2003. Dichotomous Keys and Mapping Codes for Wetland Landscape Position, Landform, Water Flow Path, and Waterbody Type Descriptors. U.S. Fish and Wildlife Service, National Wetlands Inventory Program, Northeast Region, Hadley MA. 44 pp.