Guidance for Understanding a Biomonitoring Wetland Epiphytic Algae Aquatic Life Classification Attainment Report

The ME DEP Biological Monitoring Program generates a Wetland Epiphytic Algae Aquatic Life Classification Attainment Report for each 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 Wetland Epiphytic Algae Aquatic Life Classification Attainment Report and explains 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. Reports can be found in the Biomonitoring data mapping project, accessible through the Data and Maps page of our website. Access the data by clicking on a station within the map and then selecting the desired report from the 'Report' column.

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

Station Information

Station Number:	**W-331**	Trip ID: 2019-331	River Basin:	Saco
Waterbody:	NORTHWEST RIVER		HUC8 Name:	Presumpscot
Town:	Sebago		Latitude:	43 54 55.6 N
Mitigation Monitoring Site: No			Longitude:	70 41 27.11 W

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).
- **River Basin**– This is the name of the major river watershed that contains this wetland.
- **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 this link.
- **Latitude** and **Longitude** – 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.

Sample Information

Sample ID: WA-331-2019E (1908)	Type of Sample: PLANT RUBBINGS	Date Sampled: 6/24/2019
Bottle # : 1908	Sampling Organization: BIOMONITORING UNIT	Taxonomist: ECOANALYSTS IDAHO

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

- **Sample ID** – Unique identifier assigned to each biological sample, representing the sample method, the year sampled and the station number. "WA" with the suffix "E" Indicates that this is wetland epiphytic algae sample.

- **Type of Sample -** "Plant Rubbings" indicates the epiphytic algae was collected from submerged plant stems.
- **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 applicable standard operating procedures (SOPs) 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 algae must be performed or supervised by a professional taxonomist who has the qualifications specified in the Biomonitoring QAPP. This field shows the name of the organization performing the taxonomy for the sample.

Classification Attainment				
Statutory Class: A		**Final Determination:**	**A**	Date: 12/9/2020
Model Result with P≥0.6:	A	**Reason for Determination:**	**Model L&w**	
Date Last Calculated:	10/6/2020	Comments:		

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.
- **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. In the example above, the model result predicts 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). Although rare, 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			
First Stage Model		C or Better Model	
Class A: 0.93	Class C: 0.00	Class A, B, or C	1.00
Class B: 0.07	NA: 0.00	Non-Attainment	0.00
B or Better Model		A Model	
Class A or B	1.00	Class A	0.93
Class C or Non-Attainment	0.00	Class B or C or Non-Attainment	0.07

Model Probabilities

DEP uses a linear discriminant model based on quantitative ecological attributes of the algal 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 community, to determine the probabilities that a site attains one of the classes 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 water quality class Great Pond A (GPA) is the sole classification for natural lakes and ponds. A model prediction of attaining class A is considered attainment of class GPA standards. 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		
		Reference Range (10th or 90th percentile value)
Relative Richness of Diatoms in the Eunotiaceae Family	0.170	>0.09
Relative Density of Eutrophentic Diatoms	0.031	<0.15
Relative Richness of Oligosaprobic Diatoms	0.370	>0.37
Relative Richness of Intermediate Taxa	0.600	>0.61
Relative Richness of Sensitive Taxa	0.200	>0.13
Maine Tolerance Index Score for Wetland Epiphytic Algae	31.27	<38

Model Variables

- **Relative Richness of Diatoms in the Eunotiaceae Family –** This is a family of Pennate Diatoms. In general, the Eunotiaceae species found in Maine are typically found in low alkalinity, oligotrophic to mesotrophic, acidic to neutral water. This is calculated by dividing this taxonomic group's richness by the sample's total generic richness.
- **Relative Density of Eutrophentic Diatoms –** This metric is based on van Dam's trophic values and exclude diatoms without values or are indifferent (value 7). Eutrophentic diatoms (van Dam values of 5 or 6) prefer eutrophic conditions. This variable increases with watershed disturbance and eutrophication. This is calculated by dividing the number of diatoms with van Dam trophic values of 5 or 6 by the total number of diatoms with van Dam trophic values (excluding 7).
- **Relative Richness of Oligosaprobic Diatoms** – This metric is based on van Dam's saprobic values. Oligosaprobic diatoms (van Dam value of 1) are found in waters with high dissolved oxygen and low biological oxygen demand. This metric is expected to decrease in response to watershed development and increased nutrient loads. This is calculated by dividing the number of diatoms with van Dam saprobic values of 1 by the total number of diatoms with a van Dam saprobic value.
- **Relative Richness of Intermediate Taxa** – Based upon Maine Tolerance Index Scores. This is calculated by dividing the richness of this group of organisms by the sample's total generic richness.
- **Relative Richness of Sensitive Taxa** – Based upon Maine Tolerance Index Scores. This is calculated by dividing the richness of this group of organisms by the sample's total generic richness.

- **Maine Tolerance Index Score for Wetland Epiphytic Algae (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. 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 index based on the Epiphytic Algae tolerance values of the organisms found in the sample, and excludes taxa without values.

Other Variables

	Density (cells/cm^2)	Relative Density	Richness	Relative Richness	Biovolume (um^3/cm^2)	Relative Biovolume
Total for Sample	3,412,445	-	47	-	11,380,527,950	-
Diatom Only	6,901,961	-	40	-	5,232,017,741	-
MTI Sensitive	3,094,379	0.454	6	0.200	2,548,749,176	0.462
MTI Intermediate	3,412,101	0.501	18	0.600	2,623,092,735	0.476
MTI Eurytopic	310,588	0.046	6	0.200	344,434,899	0.062
Ratio of MTI:						
Sensitive to Eurytopic	9.963	9.963	1.000	1.000	7.400	7.400

- **Other Variables -** An additional breakdown of sample components in relation to the entire sample.
- **Ratios of MTI Sensitive to Eurytopic** – Sum of taxa with a tolerance value < 22.0 divided by sum of taxa with and tolerance value > 43.0 for each group, i.e. Density, Relative density, etc.

Click here for more information about the epiphytic algae and their ecology.

Water Chemistry

Sample Date: 6/24/2019 11:00:00 AM

Collection Method	Parameter	Value	Units	Qualifier
Grab Sample	Chloride	5	mg/l	
Grab Sample	Nitrate + Nitrite As Nitrogen		mg/l	U
Grab Sample	Total Alkalinity	6	mg/l	
Grab Sample	Total Kjeldahl Nitrogen (organic And Nh3) As Nitrogen	0.2	mg/l	
Grab Sample	Total Phosphorus Mixed Forms (po4 And Organic) As Phosphorus	8	ug/l	
Grab Sample	True Color	40	ptco	
In-situ	Dissolved Oxygen	8.58	mg/l	
In-situ	Dissolved Oxygen Saturation	93.3	%	
In-situ	pH	6.41		
In-situ	Specific Conductance	35.4	us/cm	
In-situ	Temperature	19.3	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.
Click here to see SOPs for procedures.

Landcover Summary - 2004 Data							
Total Area (ac)	36867	High Int. Dev. %	0.0	Water %	2.1	Non-vegetated %	0.2
		Med Int. Dev. %	0.0	Wetland %	4.6	Tilled Agriculture %	0.0
		Low Int. Dev. %	0.9	Upland Woody %	91.4	Grassland %	0.2
		Development %	1.0	Natural %	96.1	Human Altered %	1.8
						Impervious %	0.4
Total Land (ac)	36095	High Int. Dev. %	0.0	Water %	N/A	Non-vegetated %	N/A
		Med Int. Dev. %	0.1	Wetland %	4.7	Tilled Agriculture %	0.0
		Low Int. Dev. %	1.0	Upland Woody %	93.3	Grassland %	0.2
		Development %	1.0	Natural %	98.2	Human Altered %	1.8
						Impervious %	0.5

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 or the ME Office of GIS.

- **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.

Summary of Habitat Characteristics	
Human Disturbance	
Total Score:	8
Hydrologic Modifications to Wetland:	3
Vegetative Modifications to Wetland:	0
Evidence of Chemical Pollutants:	0
Watershed Characterization and Potential NPS Pollution Impacts:	5

Dominant Plant Species: TYPHA ALL AROUND PERIMETER OF POND

Additional Plant Community Observations:

Habitat Classification: AQUATIC MACROPHYTE BED

Substrate Classification: SILT/MUCK SUBSTRATE

Visible Flow: Yes Rain In Previous 24 Hours: Unknown

Sample Comments: WATER CLOUDY, GREEN AND VERY TURBID; ALGAE ABUNDANT BUT NOT FLOATING AS A FILM ON SURFACE; SMALL FISH AND MANY FROGS OBSERVED.

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

- **Human Disturbance** – A field-based stressor assessment based on the categories listed above. A lower score indicates less human disturbance, and higher score is indicative of more disturbance. Click here for the habitat disturbance protocol.
- **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.
- **Additional Plant Community Observations** – Notes regarding significant or unusual plant observations.
- **Habitat Classification** – Type of habitat immediately surrounding where samples were collected. Click here to see the Wetland field sheet for the list of possible habitat types.
- **Substrate Classification** – Type of substrate found where samples were collected. Click here to see the Wetland field sheet for the list of possible substrate types.
- **Visible Flow** – Y/N characterization of flow through the wetland sampling location.
- **Sample Comments** – Notes regarding significant or unusual aspects of the site or sample.

Common Plants Observed					
Scientific Name	**Common Name**	**Maine Taxonomic Code**	**Plant CoC Score**	**Wetland Indicator Status**	**Growth Form**
Brasenia schreberi	Brasenia schreberi	LW-34023103001001	6	OBL	FORB/HERB
Dulichium arundinaceum	Dulichium arundinaceum	LW-34010501005001	5	OBL	GRAMINOID
Nuphar lutea ssp. variegata	Nuphar lutea ssp. variegata	LW-34023103002002	4	OBL	FORB/HERB
Nymphaea odorata	American white waterlily	LW-34023103003002	5	OBL	FORB/HERB
Nymphoides cordata	Little floatingheart	LW-34024802002001	6	OBL	FORB/HERB
Pontederia cordata	Pickerelweed	LW-34010906002002	4	OBL	FORB/HERB
Potamogeton	Potamogeton	LW-34011101001			PLANT

- **Common Plants Observed** – A list of the most abundant taxa seen at the site and their growth form.

- **Maine Taxonomic Code** – The Biomonitoring Unit use a hierarchical coding system to assign unique numeric identifiers to each taxa in our database.
- **Plant CoC score** – The coefficients of conservatism (C values) assigned to individual plant species based on their tolerance to degradation and the degree to which the species is faithful to natural habitats (Swink & Wilhelm 1994).
- **Wetland Indicator Status –**Each plant species is assigned a rating that represented the estimated probability, or frequency, with which it is thought to occur in wetlands. Click here for Wetland indicator category definitions (external U.S.FWS document).
- **Growth Form –** The typical growth form exhibited by a plant species.

Additional Summary Variables						
	Density (cells/cm^2)	**Relative Density**	**Richness**	**Relative Richness**	**Biovolume (um^3/cm^2)**	**Relative Biovolume**
Diatom Growth Forms and Motility:						
Unattached	3,278,431	0.475	7	0.175	2,918,774,797	0.558
Variable	253,072	0.037	2	0.050	58,086,902	0.011
Erect	2,047,582	0.297	10	0.250	1,496,779,174	0.286
Stalked	483,137	0.070	5	0.125	494,580,154	0.095
Prostrate	839,739	0.122	16	0.400	263,796,714	0.050
Motile	379,608	0.055	10	0.250	210,072,680	0.040

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

- **Density (cells/cm^2)**– Calculated independently for each taxon or group of taxa, the density of cells per cm^2 of the sample.
- **Relative Density** – This is calculated by dividing a group's density by the sample's total density.
- **Richness** – Number of species within a group or species.
- **Relative Richness** - This is calculated by dividing a group's richness by the sample's total richness.
- **Biovolume** (um^3/cm^2) – A measure of algal biomass calculated independently for each taxon or group of taxa, the density of cells per cm^2 in a given volume of the sample.
- **Relative Biovolume** – This is calculated by dividing a group's biovolume by the sample's total biovolume.
- **Diatom Growth Form** - Diatoms have different growth forms, including prostrate (like a water penny), erect (standing on end), stalked, or unattached (free floating). Ecological theory suggests that diatom communities have successional stages following colonization of a substrate. Non-motile, prostrate diatoms, particularly *Achnanthidium minutissimum*, can be the dominant taxa on recently scoured substrates. Erect diatoms become more dominant as the mat ages. Stalked diatoms and diatoms that are both prostrate and motile become dominant if the mat thickens. Nutrient enrichment can increase mat thickness.
- **Motility** - Some taxa are able to move, either through the water column using flagallae, or across submerged surfaces using a gliding movement as seen in raphid diatoms and certain blue green algae. Motility provides an ecological advantage when the sediments are

unstable. A positive correlation between % motile algae and the concentrations of suspended sediments and nutrients has been found.

Station Number: W-331	Waterbody: NORTHWEST RIVER				Town: Sebago	
Sample ID: WA-331-2019E (1908)	Bottle # : 1908				Calculated: 10/6/2020	
	Density (cells/cm^2)	Relative Density	Richness	Relative Richness	Biovolume (um^3/cm^2)	Relative Biovolume
Taxa Group:						
Pennate Diatom	6,625,882	0.494	36	0.766	4,763,899,153	0.419
Centric Diatom	276,078	0.021	4	0.085	468,118,588	0.041
Cyanobacteria	4,033,431	0.301	2	0.043	174,401,518	0.015
Filamentous Cyanobacteria	4,033,431	0.301	2	0.043	174,401,518	0.015
Green Algae	2,477,053	0.185	5	0.106	5,974,108,691	0.525
Colonial Green	0	0.000	0	0.000	0	0.000
Filamentous Green	2,433,211	0.181	3	0.064	5,829,760,072	0.512
Unicellular Green	0	0.000	0	0.000	0	0.000
Desmid	43,842	0.003	2	0.043	144,348,618	0.013
Red Algae	0	0.000	0	0.000	0	0.000
Euglenoid	0	0.000	0	0.000	0	0.000
Chrysophyte	0	0.000	0	0.000	0	0.000
Cryptophyte	0	0.000	0	0.000	0	0.000
Dinoflagellate	0	0.000	0	0.000	0	0.000
Yellow Green Algae	0	0.000	0	0.000	0	0.000
Haptophyte	0	0.000	0	0.000	0	0.000
Raphidophyte	0	0.000	0	0.000	0	0.000
Synurophyte	0	0.000	0	0.000	0	0.000

- **Taxa Groupings –** The epiphytic algal groupings contain both true alga and functional similar groups such as cyanobacterium and dinoflagellates. They are grouped together based on photosynthesis as a primary method of growth. The sample is presented in both taxonomic and ecological groups.
    - **Bacillariophyceae** (diatoms) - Ubiquitous as a group, maximum abundance in cold water, often dominant in acidic waters.
    - **Cyanobacteria** - Most common in alkaline, nutrient rich waters, often dominate in eurytrophic sites.
    - **Chlorophyta and Charophyta** (green algae) - Tremendous variability, blooms generally indicative of high N, or at least high N:P ratio
    - **Desmids** – Often found in oligotrophic or mesotrophic, slightly acidic waters.
    - **Red algae** - Many taxa are indicators of good water quality, general preferring oligiotrophic, oligosaprobic waters.
    - **Euglenoids** - Abundant at sites having high organic matter and/or pollution from animal waste, etc.
    - **Chrysophytes** (golden algae) - Usually cold water forms, common in low nutrient waters.
    - **Cryptophytes** – Often found in clear, oligotrophic lakes. Often peak during winter in lakes.
    - **Dinoflagellates** - Ubiquitous, most abundant in organically enriched waters. May be common in lakes and ponds with slightly elevated salinity. Sometimes increase

following diatom blooms when silica concentrations in water low (seasonal succession).

- **Xanthophyta** (yellow-green algae) - Often found in dystrophic or mesotrophic waters. Most diverse in acidic waters with high concentration of dissolved organic matter.
- **Cryptomonas** – Ubiquitous as a group, rarely dominant but prefer high nutrient, organically enriched waters.
- **Haptophytes** – Uncommon in freshwaters, may be found in neutral to basic waters.
- **Raphidophytes** - May be common in dystrophic and eutrophic, acidic waterbodies.
- **Synurophytes** - Thrive in slightly acidic conditions with low specific conductance, alkalinity and nutrients, and moderate concentration of humic substances. Excellent as bioindicators, many species have limited distribution along different environmental gradients.

Station Number: W-331	Waterbody: NORTHWEST RIVER				Town: Sebago	
Sample ID: WA-331-2019E (1908)	Bottle # : 1908				Calculated: 10/6/2020	
	Density (cells/cm^2)	Relative Density	Richness	Relative Richness	Biovolume (um^3/cm^2)	Relative Biovolume
Diatom Autecology Groups:						
High Oxygen	4,520,784	0.851	15	0.556	3,624,452,699	0.846
Low Oxygen	23,007	0.004	2	0.074	7,646,820	0.002
N-Autotrophic	4,141,176	0.798	14	0.538	3,228,647,529	0.765
N-Heterotrophic	57,516	0.011	4	0.154	126,885,095	0.030
Oligosaprobic	1,127,320	0.212	10	0.370	751,418,771	0.175
Polysaprobic	103,529	0.019	2	0.074	113,729,958	0.027
Oligotrophentic	782,222	0.160	6	0.250	737,878,677	0.181
Eutrophentic	149,542	0.031	6	0.250	197,064,232	0.048
Acidobiontic	69,020	0.013	1	0.037	47,105,882	0.011
Brackish	0	0.000	0	0.000	0	0.000
Dry Condition	0	0.000	0	0.000	0	0.000

- **Diatom Autecology Groups** based on ecological indicator values assigned by van Dam et. al.
  - **High Oxygen** – Diatoms that require continuously high levels of dissolved oxygen.
  - **Low Oxygen** – Diatoms tolerant of low oxygen saturation.
  - **N-Autotrophic** – Diatoms adapted to survive when nitrogen is scarce and primarily use inorganic forms of N. They lose their competitive advantage when nutrients increase with watershed disturbance or eutrophication.
  - **N-Heterotrophic** – Diatoms adapted to continuously elevate concentrations of organically bound N. They can digest organic matter and can move diurnally which allows them to gain a competitive advantage when nutrients increase.
  - **Oligosaprobic** – Diatoms with a preference for high dissolved oxygen and low biological oxygen demand.
  - **Polysaprobic** – Diatoms tolerant of low oxygen saturation and elevated biological oxygen demand.
  - **Oligotrophentic** – Diatoms with a preference for low nutrient environments.
  - **Eutrophentic** – Diatoms occurring mainly in high nutrient environments.

- **Acidobiontic** – Diatoms occurring mainly at pH values <5.5.
- **Brackish** – Diatoms tolerant of elevated salinity.
- **Dry Conditions** – Diatoms tolerant of temporary drying.

Wetland Epiphytic Algae Aquatic Life Classification Attainment Report

Bottle # : 1908 **Waterbody:** Northwest River - W-331 **Town:** Sebago
Sample ID: WA-331-2019E (1908) **Station Number:** W-331

Taxa Name	Group	Density (cells/ cm^2)	Relative Density			Biovolume (um^3/ cm^2)	Relative Biovolume	Form	Mot-ility	van Dam Index Values							Maine Epi Tolerance
			All	Rank	Diatoms					pH	NO2	S	T	M	Sal		
Leptolyngbya	Filamentous Cyanobacteria	745,308	5.557%	4		23,402,670	0.206%										
Hapalosiphon hibernicus	Filamentous Cyanobacteria	3,288,123	24.515%	1		150,998,848	1.327%										
Aulacoseira ambigua	Centric Diatom	23,007	0.172%	41	0.3%	26,006,588	0.229%	U	N	4	2	3	2	5	1	2	19.3-S
Melosira varians	Centric Diatom	23,007	0.172%	41	0.3%	117,029,647	1.028%	U	N	4	3	3	3	5	2	2	64.2-E
Discostella stelligera	Centric Diatom	69,020	0.515%	28	1.0%	97,524,706	0.857%	U	N						1	2	31.3-I
Lindavia	Centric Diatom	161,046	1.201%	14	2.3%	227,557,647	2.000%	U	N								
Fragilaria sepes	Pennate Diatom	195,556	1.458%	12	2.8%	52,565,333	0.462%	V	N	3	1	1	1	2	2	1	38.7-I
Staurosira construens var. venter	Pennate Diatom	57,516	0.429%	29	0.8%	5,521,569	0.049%	V	N	4	2	1	2	4	1	2	32.4-I
Ulnaria acus	Pennate Diatom	69,020	0.515%	28	1.0%	44,172,549	0.388%	E	N	4	2	2	3	5	2	2	57.4-E
Ulnaria ulna	Pennate Diatom	92,026	0.686%	23	1.3%	112,363,922	0.987%	E	N	4	2	3	4		2	2	44.5-I
Tabellaria	Pennate Diatom	161,046	1.201%	14	2.3%	173,929,412	1.528%	U	N								
Tabellaria fenestrata	Pennate Diatom	92,026	0.686%	23	1.3%	77,301,961	0.679%	U	N	3	1	1	2	2		1	29.1-I
Tabellaria flocculosa	Pennate Diatom	2,749,281	20.498%	2	39.8%	2,199,424,837	19.326%	U	N	2	1	1	2	3	3	1	24.7-S
Achnanthidium exilis	Pennate Diatom	11,503	0.086%	47	0.2%	1,288,366	0.011%	P	N	5	1	1	1	2		2	
Achnanthidium macrocephalum	Pennate Diatom	23,007	0.172%	41	0.3%	883,451	0.008%	P	N								

The **Aquatic Life Taxonomic Inventory Report** section is a list of all taxa found in the sample including their functional group, density and biovolume as defined above. Additional information is described below.

- **Form** –Growth Forms (diatoms only) E= erect, P=prostrate, S=stalked, U=unattached, V=variable
- **Motility** –N= not motile, M = motile , H = highly motile, V=variable within genus.
- **van Dam Index Values** (1994) – These values provide a measure of the general tolerance level of individual species towards the following stressors.
    - (**pH**) ranked 1-5 by preference for increasing pH with 6 showing no apparent preference.
    - (**N**) Nitrogen uptake metabolism ranked 1-4 by increasing tolerance of organic enrichment.
    - (**O2**) Oxygen requirements 1 = 100% DO saturation, 2 = >75% DO saturation, 3 = >50% DO saturation, 4 = >30% DO saturation, 5 = >10% DO saturation
    - (**S**) Saprobic values relate to the amount of organic pollution, biological oxygen demand, and DO concentrations. Values range from 1 (intolerant of organic pollution) to 5 (highly tolerant of organic pollution)
    - (**T**) Trophic State value 1 = oligotraphentic, 2 = oligo-mesotraphentic, 3 = mesotraphentic, 4 = meso-eutraphentic, 5 = eutraphentic, 6 = hypereutraphentic, 7 = indifferent to trophic state
    - (**M**) Moisture value 1 = very rarely outside water bodies, 2 = sometimes on wet places, 3 = regularly on wet places, 4 = temporarily in dry places, 5 = nearly exclusively outside water bodies

- (**Sal**) Salinity value 1 = freshwater (<100 mg/L chloride), 2 = fresh-brackish (<500 mg/L), 3 = brackish-freshwater (500-1000 mg/L), 4 = brackish (1000-5000 mg/L)

- **Maine Epi Tolerance –** The Maine Tolerance Wetland (MTW) Epiphytic algae values are based on a scale ranging from 1 (most sensitive) to 100 (most tolerant) and includes all algae (diatoms and soft). The MTW values represent the major pattern in taxa optima for TP, NO_2+NO_3, Specific Conductance, Percent Developed Watershed, Percent Impervious Surfaces, and the Maine Wetland Human Disturbance Score. 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). Not all taxa collected by MDEP have tolerance values assigned to them; a frequency of occurrence threshold was set when the values were calculated

References

Van Dam, H. Mertens, A. Sinkeldam, J. 1994. A Coded Checklist and Ecological Indicator values of Freshwater Diatoms from the Netherlands. Netherlands Journal of Aquatic Ecology 28(1) 117-133.