Appendix 1-a

METHODS FOR THE CALCULATION OF INDICES AND MEASURES OF COMMUNITY STRUCTURE USED IN THE ORIGINAL1992 LINEAR DISCRIMINANT MODELS

Variable
Number

1 **Total Abundance**

Count all individuals in all replicate samples from one site and divide by the number of replicates to yield mean number of individuals per sample.

2 **Generic Richness**

Count the number of different genera found in all replicates from one site.

Counting Rules for Generic Richness:

1) A family level identification with less than or equal to one taxon identified to a lower taxonomic level (i.e. one genus or species) will be counted as a separate taxon in Generic Richness counts.

2) A family with more than one taxon identified to a lower taxonomic level will not be counted towards Generic Richness. Counts will be split proportionately among the genera that are present.

3) Higher level taxonomic identifications (Phylum, Class, Order) are not counted toward Generic Richness unless they are the only representative.

4) Pupae are ignored in all calculations.

5) All population counts at the species level will be aggregated to the generic level.

3 **Plecoptera Abundance**

Count all individuals from the order Plecoptera in all replicate samples from one site and divide by the number of replicates to yield mean number of Plecopteran individuals per sample.

4 **Ephemeroptera Abundance**

Count all individuals from the order Ephemeroptera in all replicate samples from one site and divide by the number of replicates to yield mean number of Ephemeropteran individuals per sample.

5 **Shannon-Wiener Generic Diversity (Shannon and Weaver 1963.)**

After adjusting all counts to genus as described under "Counting Rules for Generic Richness":

$$\bar{d} = \frac{c}{N}\left(N \log_{10} N - \sum n_i \log_{10} n_i\right)$$

where: $\bar{d}$ = Shannon-Wiener Diversity
c = 3.321928 (converts base 10 log to base 2)
N = Total Abundance of Individuals
n_i = Total Abundance of Individuals in the i^{th} taxon

6 **Hilsenhoff Biotic Index (Hilsenhoff 1987.)**

$$BI = \sum \frac{n_i a_i}{N}$$

where: BI = Biotic Index
n_i = number of individuals in the i^{th} taxon
a_i = tolerance value assigned to that taxon
N = total number of individuals, with a tolerance value, in sample

7 **Relative Abundance Chironomidae**

Find abundance of Chironomidae (as for abundance of Ephemeroptera) and divide by Total Abundance of individuals.

8 **Relative Richness Diptera**

Count the number of different genera from the order Diptera (follow counting rules for Generic Richness) and divide by Generic Richness.

9 ***Hydropsyche* Abundance**

Count all individuals from the genus *Hydropsyche* in all replicate samples from one site, and divide by the number of replicates to yield mean number of *Hydropsyche* individuals per sample.

11 ***Cheumatopsyche* Abundance**

Count all individuals from the genus *Cheumatopsyche* in all replicate samples from one site and divide by the number of replicates to yield mean number of *Cheumatopsyche* individuals per sample.

12 **EPT Generic Richness Divided by Diptera Richness**

Find EPT Generic Richness (Variable 19) and divide by Diptera Generic Richness.

13 **Relative Abundance Oligochaeta**

Find abundance of Oligochaetes (as for abundance of Ephemeroptera) and divide by Total Abundance of individuals.

15 **Perlidae Abundance (Family Functional Group)**

Count all individuals from the family Perlidae (Appendix 1-c) in all replicate samples from one site and divide by the number of replicates to yield mean number of Perlidae per sample.

16 **Tanypodinae Abundance (Family Functional Group)**

Count all individuals from the subfamily Tanypodinae (Appendix 1-c) in all replicate samples from one site and divide by the number of replicates to yield mean number of Tanypodinae per sample.

17 **Chironomini Abundance (Family Functional Group)**

Count all individuals from the tribe Chironomini (Appendix 1-c) in all replicate samples from one site and divide by the number of replicates to yield mean number of Chironomini per sample.

18 **Relative Abundance Ephemeroptera**

Find abundance of Ephemeroptera (Variable 4) and divide by Total Abundance of individuals.

19 **EPT Generic Richness**

Count the number of different genera from the order Ephemeroptera (E), Plecoptera (P), and Trichoptera (T) (Follow counting rules for Generic Richness, Variable 2).

21 **Summed Abundance's of**: ***Dicrotendipes, Micropsectra, Parachironomus and Helobdella***

Find abundance of the 4 genera (as for abundance of Ephemeroptera Variable 4) and sum them.

23 **Relative Plecoptera Richness**

Find Plecoptera Richness and divide by Generic Richness.

24 **Relative Abundance *Brachycentrus***

Find abundance of *Brachycentrus* (as for Abundance of Ephemeroptera) and divide by Total Abundance of individuals.

25 **Summed Abundance's of: *Cheumatopsyche, Cricotopus, Tanytarsus and Ablabesmyia***

Find abundance of the 4 genera (as for abundance of Ephemeroptera, Variable 4) and sum them.

26 **Summed Abundance's of: *Acroneuria and Stenonema***

Find abundance of the 2 genera (as for the abundance of Ephemeroptera, Variable 4) and sum them.

28 **EP Generic Richness/14**

Sum Ephemeroptera Generic Richness plus Plecoptera Generic Richness and divide by 14 (maximum expected for Class A).

29 **Dominant A Indicator Taxa/5**

Find the 5 most abundant taxa in the community and calculate the proportion that are A indicator taxa as listed in Appendix 1-b

30 **Presence of A Indicator Taxa/7**

Count the number of A indicator taxa, as listed in Appendix 1-b, that are present in the community and divide by 7 (total possible number).

Appendix 1-b

Indicator Taxa: Class A

Brachycentrus (Trichoptera: Brachycentridae)
Serratella (Ephemeroptera: Ephemerellidae)
Leucrocuta (Ephemeroptera: Heptageniidae)
Glossosoma (Trichoptera: Glossosomatidae)
Paragnetina (Plecoptera: Perlidae)
Eurylophella (Ephemeroptera: Ephemerellidae)
Psilotreta (Trichoptera: Odontoceridae)

Appendix 1-c

FAMILY FUNCTIONAL GROUPS

PLECOPTERA

Perlidae

Acroneuria
Attaneuria
Beloneuria
Eccoptura
Perlesta
Perlinella
Neoperla
Paragnetina
Agnetina

CHIRONOMIDAE

Tanypodinae

Ablabesmyia
Clinotanypus
Coelotanypus
Conchapelopia
Djalmabatista
Guttipelopia
Hudsonimyia
Labrundinia
Larsia
Meropelopia
Natarsia
Nilotanypus
Paramerina
Pentaneura
Procladius
Psectrotanypus
Rheopelopia
Tanypus
Telopelopia
Thienemannimyia
Trissopelopia
Zavrelimyia

Appendix 1-c

FAMILY FUNCTIONAL GROUP (continued)

Chironomini

Pseudochironomus
Axarus
Chironomus
Cladopelma
Cryptochironomus
Cryptotendipes
Demicryptochironomus
Dicrotendipes
Einfeldia
Endochironomus
Glyptotendipes
Goeldichironomus
Harnischia
Kiefferulus
Lauterborniella
Microchironomus
Microtendipes
Nilothauma
Pagastiella
Parachironomus
Paracladopelma
Paralauterborniell
Paratendipes
Phaenopsectra
Polypedilum
Robackia
Stelechomyia
Stenochironomus
Stictochironomus
Tribelos
Xenochironomus