Appendix F: Macroinvertebrate IBI metric information

Table E1 – Metric information for Large River MIBI, stream types 1 and 2.

Metric Name	Metric Type	Target Group	Metric Calculation Description	Response	Transformation	Drainage Correction	Ceiling	Floor
Percent (%) Dominant Five Taxa	Relative Adundance	5 most abundant taxa	Relative abundance (%) of dominant five taxa in subsample (Chironomid genera treated individually)	increase	none	none	41.7	82.3
Hilsenhoff Biotic Index, MN TVs	Biotic Index	MN Tolerance, All Taxa	Abundance weighted average of each taxon using MN derived tolerance values.	increase	none	none	5.5	8.3
Intolerant Taxa	Richness	MN Tolerance <=4	Taxa richness of countable macroinvertebrates with tolerance values less than or equal to 4, using MN derived tolerance values	decrease	none	none	18.2	0
Odonata Taxa	Richness	Odonata Taxa	Taxa richness of countable Odonata taxa	decrease	none	none	5	0
Predator Taxa	Richness	FFG = Predator	Taxa richness of countable predator taxa	decrease	none	none	18.3	3.5
Total Taxa	Richness	All Taxa	Total taxa richness of all countable macroinvertebrates	decrease	none	none	57.6	24
Percent (%) Trichoptera-Hydropsychidae	Relative Adundance	Trichoptera, excluding Hydropsychidae	Relative abundance (%) of non-Hydropsychidae Trichoptera individuals in subsample	decrease	log10(x+1)	none	22.8	0
Percent (%) VeryTolerant	Relative Adundance	MN Tolerance >=8	Relative abundance (%) of macroinvertebrate individuals in subsample with tolerance values equal to or greater than 8, using MN derived tolerance values	increase	none	none	12.8	78.7

Table E2 – Metric Information for High Gradient Stream MIBI, stream types 3 and 5.

Metric Name	Metric Type	Target Group	Metric Calculation Desctiption	Response	Transformation	Drainage Correction	Ceiling	Floor
Climber Taxa	Richness	Habitat = Climber	Taxa richness of countable climber taxa	decrease	none	none	12.0	2.7
Clinger Taxa %	Relative Richnes	Habitat = Clinger	Relative percentage of countable taxa adapted to cling to substrates in swift flowing water	decrease	none	none	46.0	20.0
Percent (%) Dominant Five Taxa	Relative Adundance	5 most abundant taxa	Relative abundance (%) of dominant five taxa in subsample (chironomid genera treated individually)	Increase	none	none	38.2	78.2
Hilsenhoff Biotic Index, MN TVs	Biotic Index	MN Tolerant, All Taxa	Abundance weighted average of each taxon using MN derived tolerance values. Only count taxa with a TV.	Increase	none	none	4.9	8.3
Insect Taxa %	Relative Richnes	Insect Taxa	Relative percentage of insect taxa	decrease	arcsin(sqrt(x))*	none	93.6	72.5
Odonata Taxa	Richness	Odonata Taxa	Taxa richness of countable Odonata taxa	decrease	log10(x+1)	none	5.0	0.0
Plecopotera Taxa	Richness	Plecoptera Taxa	Taxa richness of countable Plecoptera taxa	decrease	log10(x+1)	none	3.0	0.0
Predator Taxa Richness (excludes genus level Chironomidae)	Richness	FFG = Predator	Taxa richness of countable predator taxa (excluding Chironomidae predator taxa at the genus level)	decrease	none	none	16.0	3.0
Tolerant %	Relative Richnes	MN Tolerance >=6	Relative richness of macroinvertebrate indivduals in subsample with tolerance values equal to or greater than 6, using MN derived tolerance values.	Increase	none	none	93.7	47.1
Trichoptera Taxa	Richness	Trichoptera Taxa	Taxa richness of countable Trichoptera taxa	decrease	none	none	12.0	2.0

*Value of x must range from 0 to 1

Table E3 – Metric information for Low Gradient Stream MIBI, stream types 4, 6, and 7.

Metric Name	Metric Type	Target Group	Metric Description	Response	Transformation	Drainage Correction	Ceiling	Floor
Clinger Taxa	Richness	Habitat = Clinger	Taxa richness of countable clinger taxa	Decrease	none	none	17.0	2.0
Percent (%) Collector-filterers	Relative Abudance	FFG = Filterer	Relative abundance (%) of collector-filterer individuals	Decrease	none	none	37.9	0.3
Percent (%) Dominant Five Taxa	Relative Abudance	5 most abundant taxa	Relative abundance (%) of dominant five taxa in subsample (chironomid genera treated individually)	Increase	none	none	43.2	90.8
Hilsenhoff Biotic Index, MN Tvs	Biotic Index	MN Tolerant, All Taxa	Abundance weighted average of each taxon using MN derived tolerance values	Increase	none	none	5.8	8.9
Very Intolerant Taxa Richness	Richness	MN Tolerance <=2	Taxa richness of countable macroinvertebrates with tolerance values less than or equal to 2, using MN TVs	Decrease	log10(x+1)	none	3.0	0.0
POET Taxa	Richness	Plecoptera, Odonata, Ephemeroptera, Trichoptera Taxa	Combined richness of countable taxa within the orders Plecoptera, Odonata, Ephemeroptera, & Trichoptera, with all Baetid taxa treated as the family level	Decrease	none	none	16.0	2.0
Predator Taxa	Richness	FFG = Predator	Taxa richness of countable predator taxa	Decrease	none	none	18.0	4.0
Taxa Taxa	Richness	All Taxa	Total taxa richness of all countable macroinvertebrates	Decrease	none	none	53.0	19.0
Trichoptera %	Relative Richness	Trichoptera Taxa	Relative richness of countable Trichoptera taxa	Decrease	none	none	16.4	0.0
Percent (%) Trichoptera-Hydropsychidae	Relative Abundanc	Trichoptera, excluding Hydropsychidae	Relative abundance (%) of non-hydropsychid Trichoptera individuals in subsample	Decrease	log10(x+1)*	none	10.8	0.0

Table E4 – Metric Information for Northern Coldwater Stream MIBI, stream type 8.

Metric Name	Metric Type	Target Group	Metric Description	Response	Transformation	Drainage Correction	Ceiling	Floor
Collector-Gatherer Taxa %	Relative Richness	FFG = Gatherer	Relative richness of countable collector-gatherer taxa	Increase	none	none	22.1	41.90
Hilsenhoff Biotic Index, MN TVs	Biotic Index	MN Tolerance, all taxa	Abundance weighted average of each taxon using MN derived tolerance values.	Increase	none	none	4.22	7.03
Very Intolerant Taxa Richness	Richness	MN Tolerance <=2	Taxa richness of countable macroinvertebrates with tolerance values less than or equal to 2, Using MN TVs	Decrease	none	none	12	0.00
Long-lived Taxa %	Relative Richness	LongLived = True	Relative richness of countable long-lived taxa	Decrease	none	none	26	6.00
Non-insect Taxa %	Relative Richness	Non-insect taxa	Relative richness of countable non-insect taxa	Increase	none	none	2.47	20.79
Odonata Taxa %	Relative Richness	Odonata Taxa	Relative richness of countable odonata taxa	Decrease	none	none	9.5	0.00
POET Taxa	Richness	Plecoptera, Odonata, Ephemeroptera, and Trichoptera	Combined richness of countable taxa within the orders Plecoptera, Odonata, Ephemeroptera, & Trichoptera, with all Baetidae taxa treated at the family level	Decrease	none	none	29	8.00
Predator Taxa Richness (excludes genus level Chironomidae)	Richness	FFG = Predator	Taxa richness of countable predator taxa (excluding Chironomidae predator taxa at the genus level)	Decrease	none	none	16	5.00
Very Tolerant Taxa %	Relative Richness	MN Tolerance >=8	Relative richness of countable taxa with tolerance values equal to or greater than 8, using MN TVs.	Increase	none	none	9.2	32.50

Table E5 – Metric Information for Southern Coldwater Stream MIBI, stream type 9.

Metric Name	Metric Type	Target Group	Metric Description	Response	Transformation	Drainage Correction	Ceiling	Floor
Coldwater Biotic Index	Biotic Index	CW Tolerance	Coldwater Biotic Index score based on coldwater tolerance values derived from Minnesota taxa/temperature data.	increase	none	slope = 0.579 constant = 17.923	-0.69	1.41
Chiro:Diptera	Ratio	Diptera taxa	Ratio of Chironomidae abundance to total Dipteran abundance.	increase	none	slope = 9.428 constant = 45.12	-40.33	37.59
Percent (%) Collector – Filterers	Relative Abundance	FFG = filterers	Relative abundance (%) of collector-filterer individuals in a subsample	decrease	none	none	53.41	7.36
Hilsenhoff Biotic Index, MN TVs	Biotic Index	MN Tolerance, all taxa	Abundance weighted average of each taxon using MN derived tolerance values.	increase	none	slope = 0.375 constant = 6.046	-0.58	1.04
Very intolerant Taxa Richness	Richness	MN Tolerance <=2	Taxa richness of macroinvertebrates with tolerance values less than or equal to 2, using MN TVs	decrease	none	none	3	0.00
Trichoptera Taxa %	Relative Richness	Trichoptera Taxa	Relative richness of countable trichoptera taxa	Decrease	none	none	23.74	6.27
Percent (%) Very Tolerant	Relative Abundance	MN Tolerance >=8	Relative abundance (%) of macroinvertebrate individuals in subsample with tolerance values equal to or greater than 8, using MN TVs.	increase	none	slope = 4.239 constant = 7.249	-10.28	35.77