Table S1. Site classification based on environmental parameter and benthic macroinvertebrate data.

Sampling site	Condition	DO	pH	EC	NO_3-N	%land use	EpifauSub score	Velocity score	SedDep score	BankSta score	VegPro score	%THS	Dam present	Point source present	%BMC taxa (40 taxa)
HUC16	Reference	6.24	8.27	154	0.17	20	19	15	14	14	8	73	No	No	40
HLC16	Stressed	6.39	8.17	158.67	0.23	60	11	13	12	3	7	49.5	No	No	34
KDC16	Intermediate	6.37	8.27	299	0.23	5	17	18	12	18	18	80.5	No	No	38
KNC16	Stressed	6.38	8.4	406	0.23	55	11	14	10	4	6	50	No	No	25
NSC16	Intermediate	6.37	8.27	261.67	0.2	10	18	19	18	19	15	85.5	No	No	38
NTC16	Reference	6.25	8.4	171.33	0.2	10	18	18	19	20	14	88	No	No	54
BUC16	Intermediate	6.26	8.23	394	0.27	15	7	13	13	16	20	70.5	No	No	37
BLC16	Intermediate	6.23	8.13	390	0.3	40	7	12	11	14	19	63.5	No	Yes	41
KTC16	Reference	6.22	7.43	41.67	0.13	10	19	18	17	20	12	83	No	No	40
NNC16	Reference	6.2	7.47	20.33	0.2	15	18	17	16	18	10	78.5	No	No	40
HUH17	Intermediate	6.33	8.01	181	0.13	20	13	14	14	16	7	64	No	No	42
HLH17	Intermediate	6.93	7.96	184.33	0.6	60	13	13	11	12	14	62.5	No	No	36
KDH17	Intermediate	7.7	8.05	346.67	0.27	5	18	14	11	16	14	72.5	No	No	44
KNH17	Stressed	6.47	7.91	447.33	0.3	55	11	14	6	6	8	47.5	No	No	40
NSH17	Intermediate	7.93	8.35	324.33	0.17	10	17	18	15	17	10	79	No	No	38
NTH17	Intermediate	8.2	8.29	202	0.27	10	17	17	19	11	9	75.5	No	No	59
BUH17	Intermediate	7	7.99	442.33	0.3	15	13	10	15	7	7	61	No	No	31
BLH17	Stressed	9.73	8.12	388	0.4	40	5	3	3	9	8	35.5	No	Yes	27
KTH17	Intermediate	7.6	8.12	72	0.3	10	18	13	8	14	9	67	No	No	45
NNH17	Intermediate	7.67	8.58	75	0.33	15	15	14	8	11	10	57	No	No	41
HUC17	Reference	6.66	7.59	147.67	0.2	20	13	15	14	12	8	68	No	No	40
HLC17	Intermediate	6.29	7.61	151	0.3	60	13	13	14	13	6	62	No	No	40
KDC17	Intermediate	6.85	8.02	297	0.33	5	17	18	18	18	14	78	No	No	44
KNC17	Intermediate	6.6	8.03	413.33	0.33	55	7	13	18	14	6	62.5	No	No	39

Table S1. *Cont.*

Sampling site	Condition	DO	pH	EC	NO_3-N	%land use	EpifauSub score	Velocity score	SedDep score	BankSta score	VegPro score	%THS	Dam present	Point source present	%BMC taxa (40 taxa)
NSC17	Intermediate	5.65	8.14	251	0.23	10	17	18	13	16	10	80	No	No	41
NTC17	Reference	6.27	7.96	180.67	0.23	10	18	18	19	12	10	72	No	No	63
BUC17	Intermediate	6.99	7.77	386.67	0.33	15	14	7	7	9	6	53.5	No	No	48
BLC17	Stressed	6.25	7.84	387.33	0.33	40	3	3	3	6	8	33	No	Yes	40
KTC17	Intermediate	6.07	7.7	63	0.23	10	18	13	8	14	12	67.5	No	No	50
NNC17	Intermediate	6.16	7.62	59.67	0.23	15	13	18	8	11	8	56	No	No	45
HUH18	Intermediate	6.33	7.5	214	0.3	20	14	16	16	14	11	71	No	No	38
HLH18	Intermediate	7.02	7.56	215.33	0.37	60	18	13	16	16	10	66.5	No	No	41
KDH18	Intermediate	5.61	7.37	362.33	0.27	5	17	18	18	16	12	75.5	No	No	50
KNH18	Stressed	3.71	7.08	456.67	0.23	55	12	8	8	8	6	46	No	No	36
NSH18	Intermediate	7.09	8.08	329	0.2	10	17	20	15	14	13	79	No	No	50
NTH18	Intermediate	5.49	7.51	218	0.7	10	17	17	20	11	8	73	No	No	46
BUH18	Intermediate	5.57	7.12	450.33	0.37	15	13	10	18	7	4	63.5	No	No	36
BLH18	Stressed	7.42	7.43	412.33	0.5	40	1	1	7	4	2	21	No	Yes	27
KTH18	Reference	6.24	7.07	77.67	0.3	10	15	18	14	12	8	71.5	No	No	47
NNH18	Intermediate	6.16	7.37	83.33	0.2	15	15	12	8	11	8	58	No	No	47

Table S2. Data on relative abundance, occurrence, tolerance values (TolVal), functional feeding groups (FFGs), and habits of benthic macroinvertebrates observed from 40 sampling sites.

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
ANNILIDA									
OLIGOCHAETA									
Oligochaeta	common	17	0.125	5	12.5	10	col	bur	Morse et al. (1994)
ARTHROPODA									
CRUSTACEA									
DECAPODA									
Atyidae						5	sca	swm	Boonsoong (2007)
Caridina	common	30	0.22	7	17.5	5	sca	swm	Boonsoong (2007)
Palaemonidae						5	sca	swm	Boonsoong (2007)
Macrobrachium	common	32	0.234	16	40	5	sca	swm	Boonsoong (2007)
Parathelphusidae	common	18	0.132	6	15	5	sca	spr	Boonsoong (2007)
Potamidae	common	42	0.308	7	17.5	5	sca	spr	Boonsoong (2007)
ISOPODA									
Isopoda	common	6	0.044	3	7.5	5	und	und	Boonsoong (2007)
INSECTA									
COLEOPTERA									
Dryopidae						5	scr	clg	Morse et al. (1994)
Helichus	common	86	0.63	20	50	5	scr	clg	Morse et al. (1994)
Dytiscidae	rare	1	0.007	1	2.5	5	prd	swm	Morse et al. (1994)
Cybister	rare	1	0.007	1	2.5	5	prd	swm	Morse et al. (1994)
Hydaticus	common	22	0.161	6	15	5	prd	swm	Morse et al. (1994)
Laccophilus	common	6	0.044	4	10	5	prd	swm	Morse et al. (1994)
Neptosternus	common	22	0.161	8	20	5	prd	swm	Morse et al. (1994)
Oreodytes	rare	1	0.007	1	2.5	5	prd	swm	Morse et al. (1994)
Elmidae	common	41	0.3	11	27.5	6	col	clg	Morse et al. (1994)
Ancyronyx	common	2	0.015	2	5	6	col	clg	Merritt et al. (2008)
Dubiraphia	common	11	0.081	8	20	6	col	clg	Merritt et al. (2008)
Elmomorphus	common	9	0.066	1	2.5	6	col	clg	Present study

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
Lara	common	9	0.066	7	17.5	6	shr	clg	Merritt et al. (2008)
Macronychus	common	81	0.593	13	32.5	6	col	clg	Merritt et al. (2008)
Neocylloepus	rare	1	0.007	1	2.5	6	col	clg	Merritt et al. (2008)
Neoelmis	common	3	0.022	2	5	6	col	clg	Merritt et al. (2008)
Ordobrevia	common	14	0.103	7	17.5	6	col	clg	Morse et al. (1994)
Stenelmis	abundant	375	2.747	30	75	6	col	clg	Morse et al. (1994)
Zaitzevia	common	33	0.242	11	27.5	6	col	clg	Morse et al. (1994)
Gyrinidae						6	prd	swm	Merritt et al. (2008)
Dineutus	rare	1	0.007	1	2.5	6	prd	swm	Morse et al. (1994)
Gyretes	common	2	0.015	1	2.5	6	prd	swm	Merritt et al. (2008)
Orectochilus	common	63	0.462	16	40	6	prd	swm	Morse et al. (1994)
Porrorhynchus	common	2	0.015	1	2.5	6	prd	swm	Present study
Hydrophilidae	common	10	0.073	1	2.5	5	prd	swm	Morse et al. (1994)
Berosus	common	27	0.198	10	25	5	prd	swm	Morse et al. (1994)
Enochrus	common	14	0.103	6	15	5	col	spr	Morse et al. (1994)
Epimetopus	rare	1	0.007	1	2.5	5	prd	clm	Merritt et al. (2008)
Helochares	common	27	0.198	8	20	5	prd	clm	Morse et al. (1994)
Laccobius	common	22	0.161	9	22.5	5	prd	swm	Morse et al. (1994)
Lampyridae						5	prd	clg	Morse et al. (1994)
Luciola	common	28	0.205	13	32.5	5	prd	clg	Morse et al. (1994)
Psephenidae						6	scr	clg	Morse et al. (1994)
Eubrianax	common	29	0.212	10	25	6	scr	clg	Morse et al. (1994)
Jinbrianax	rare	1	0.007	1	2.5	6	scr	clg	Morse et al. (1994)
Mataeopsephus	common	18	0.132	2	5	6	scr	clg	Morse et al. (1994)
Microeubria	common	51	0.374	4	10	6	scr	clg	Morse et al. (1994)
Mubrianax	common	11	0.081	3	7.5	6	scr	clg	Morse et al. (1994)
Psephenoidinae	common	135	0.989	22	55	6	scr	clg	Morse et al. (1994)
Sinopsephenoides	common	13	0.095	5	12.5	6	scr	clg	Morse et al. (1994)

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
Ptilodactylidae						5	shr	clg	Morse et al. (1994)
Stenocolus	common	2	0.015	2	5	5	shr	clg	Morse et al. (1994)
Scirtidae						5	scr	clm	Morse et al. (1994)
Cyphon	common	135	0.989	8	20	5	scr	clm	Morse et al. (1994)
Staphylinidae	common	8	0.059	6	15	5	prd	clm	Morse et al. (1994)
COLLEMBOLA									
Isotomidae	rare	1	0.007	1	2.5	5	sca	clm	Morse et al. (1994)
DIPTERA									
Athericidae						2	prd	bur	Morse et al. (1994)
Suragina	common	15	0.11	9	22.5	3	prd	bur	Morse et al. (1994)
Blephariceridae						1	scr	clg	Morse et al. (1994)
Blepharicera	common	2	0.015	1	2.5	1	scr	clg	Morse et al. (1994)
Ceratopogonidae						6	scr	spr	Morse et al. (1994)
Atrichopogon	common	3	0.022	1	2.5	7	col	spr	Morse et al. (1994)
Bezzia	common	32	0.234	16	40	7	prd	bur	Morse et al. (1994)
Dasyhelea	common	8	0.059	3	7.5	7	scr	clm	Morse et al. (1994)
Chironomidae	abundant	1090	7.985	40	100	9	col	bur	Morse et al. (1994)
Culicidae	common	7	0.051	4	10	9	col	swm	Morse et al. (1994)
Dixidae	common	4	0.029	2	5	3	col	swm	Morse et al. (1994)
Empididae	common	2	0.015	2	5	6	prd	spr	Morse et al. (1994)
Ephydridae	common	2	0.015	1	2.5	5	col	bur	Morse et al. (1994)
Muscidae						7	prd	bur	Morse et al. (1994)
Limnophora	common	17	0.125	2	5	7	prd	bur	Morse et al. (1994)
Simulidae						4	fil	clg	Morse et al. (1994)
Simulium	common	186	1.363	21	52.5	4	fil	clg	Morse et al. (1994)
Stratiomyidae						6	col	spr	Morse et al. (1994)
Odontomyia	common	11	0.081	4	10	6	col	spr	Morse et al. (1994)

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
Tabanidae						5	prd	bur	Morse et al. (1994)
Dasybasis andicola	rare	1	0.007	1	2.5	5	und	und	Present study
Tabanus	common	11	0.081	9	22.5	5	prd	bur	Morse et al. (1994)
Tipulidae	rare	1	0.007	1	2.5	5	shr	bur	Morse et al. (1994)
Antocha	common	206	1.509	33	82.5	4	col	clg	Morse et al. (1994)
Hexatoma	common	96	0.703	27	67.5	5	prd	bur	Morse et al. (1994)
Limnophila	common	14	0.103	4	10	5	prd	bur	Morse et al. (1994)
Tipula	common	67	0.491	5	12.5	4	shr	bur	Morse et al. (1994)
EPHEMEROPTERA									
Baetidae	common	14	0.103	2	5	5	col	swm	Boonsoong (2007)
Acentrella	common	242	1.773	21	52.5	4	col	swm	Boonsoong (2007)
Baetiella macani	common	3	0.022	2	5	1	col	clg	Present study
Baetis	abundant	516	3.78	34	85	5	col	swm	Boonsoong (2007)
Cloeon	common	43	0.315	10	25	7	col	swm	Morse et al. (1994)
Gratia narumonae	common	3	0.022	2	5	1	col	clg	Boonsoong (2007)
Labiobaetis	abundant	297	2.176	23	57.5	4	col	swm	Somnark (2018)
Nigrobaetis	common	223	1.634	35	87.5	5	col	swm	Somnark (2018)
Platybaetis	common	2	0.015	2	5	4	col	clg	Boonsoong (2007)
Procloeon	common	105	0.769	21	52.5	7	col	swm	Morse et al. (1994)
Caenidae						7	col	spr	Boonsoong (2007)
Caenis	abundant	514	3.765	33	82.5	7	col	spr	Morse et al. (1994)
Caenoculis	common	5	0.037	3	7.5	5	col	spr	Boonsoong (2007)
Cercobrachys	common	3	0.022	2	5	7	col	spr	Merritt et al. (2008)
Clypeocaenis	common	55	0.403	10	25	7	col	spr	Boonsoong (2007)
Tigrocercus	common	124	0.908	11	27.5	7	col	spr	Present study
Ephemerellidae						5	col	spr	Boonsoong (2007)
Crinitella	common	13	0.095	4	10	3	col	spr	Boonsoong (2007)
Ephacerella commodema	common	15	0.11	6	15	4	col	spr	Boonsoong (2007)

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
Teloganopsis	common	6	0.044	4	10	4	col	spr	Boonsoong (2007)
Serratella	common	76	0.557	17	42.5	4	col	clg	Morse et al. (1994)
Uracanthella	common	112	0.82	22	55	5	col	spr	Boonsoong (2007)
Ephemeridae						6	col	bur	Morse et al. (1994)
Ephemera	common	169	1.238	24	60	6	col	bur	Morse et al. (1994)
Euthyplociidae						5	fil	clg	Boonsong (2007)
Polyplocia	common	12	0.088	7	17.5	5	fil	clg	Rattanachan (2017)
Heptageniidae	common	69	0.505	12	30	2	scr	clg	Morse et al. (1994)
Afronurus	abundant	490	3.589	34	85	3	scr	clg	Rattanachan (2017)
Asionurus	common	34	0.249	5	12.5	2	scr	clg	Boonsoong (2007)
Epeorus	common	9	0.066	6	15	1	scr	clg	Boonsoong (2007)
Rhithrogena	common	6	0.044	5	12.5	2	col	clg	Morse et al. (1994)
Thalerosphyrus lamuriensis	common	22	0.161	4	10	2	col	clg	Present study
Isonychidae						3	fil	clg	Boonsoong (2007)
Isonychia	common	6	0.044	4	10	3	fil	clg	Boonsoong (2007)
Leptophlebiidae	common	15	0.11	2	5	4	col	clg	Boonsoong (2007)
Choroterpes (Dilatognathus)	abundant	1018	7.457	30	75	4	scr	clg	Boonsong (2007)
Choroterpes (Euthraulus)	common	239	1.751	29	72.5	4	col	clg	Boonsoong (2007)
Habrophlebiodes	rare	1	0.007	1	2.5	4	col	clg	Boonsoong (2007)
Isca	common	15	0.11	4	10	4	col	clg	Boonsoong (2007)
Sangpradubina	rare	1	0.007	1	2.5	4	col	clg	Present study
Neoephemeridae						5	col	spr	Boonsoong (2007)
Potamanthellus edmundsi	common	34	0.249	12	30	5	col	spr	Boonsoong (2007)
Polymitarcyidae						2	col	bur	Morse et al. (1994)
Ephoron	common	12	0.088	5	12.5	2	col	bur	Morse et al. (1994)
Potamanthidae						5	col	clg	Boonsoong (2007)
Potamanthus formosus	common	84	0.615	9	22.5	2	col	spr	Uttaruk (2011)
Rhoenanthus	common	124	0.908	13	32.5	6	col	clg	Boonsoong (2007)

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
Prosopistomatidae						3	scr	spr	Boonsoong (2007)
Prosopistoma	common	10	0.073	5	12.5	3	scr	spr	Boonsoong (2007)
Teloganodidae						4	col	spr	Boonsoong (2007)
Teloganodes tristis	common	11	0.081	10	25	4	col	spr	Rattanachan (2017)
Tricorythidae						5	col	spr	Boonsoong (2007)
Sparsorythus	rare	1	0.007	1	2.5	5	col	spr	Present study
Vietnamellidae						1	col	spr	Rattanachan (2017)
Vietnamella thani	common	5	0.037	4	10	1	col	spr	Rattanachan (2017)
HEMIPTERA									
Aphelocheiridae						5	prd	swm	Boonsong (2007)
Aphelocheirus	common	147	1.077	23	57.5	5	prd	swm	Rattanachan (2017)
Gerridae	common	5	0.037	2	5	5	prd	ska	Boonsong (2007)
Amemboa	rare	1	0.007	1	2.5	5	prd	ska	Morse et al. (1994)
Metrocoris	rare	1	0.007	1	2.5	5	prd	ska	Morse et al. (1994)
Pleciobates pacholatkoi	common	4	0.029	2	5	5	prd	ska	Present study
Ptilomera	common	97	0.711	26	65	5	prd	ska	Uttaruk (2011)
Rheumatogonus	common	51	0.374	22	55	5	prd	ska	Present study
Ventidius	common	19	0.139	6	15	5	prd	ska	Present study
Hebridae						5	prd	swm	Morse et al. (1994)
Hyrcanus	common	5	0.037	3	7.5	5	prd	clm	Morse et al. (1994)
Merragata	common	2	0.015	2	5	5	prd	ska	Getwongsa (2010)
Nieserius	common	2	0.015	2	5	5	prd	swm	Getwongsa (2010)
Timasius	common	8	0.059	5	12.5	5	prd	swm	Somnark (2018)
Helotrephidae						5	prd	swm	Morse et al. (1994)
Helotrephes	common	4	0.029	3	7.5	5	prd	swm	Morse et al. (1994)
Hydrotrephes	common	7	0.051	1	2.5	5	prd	swm	Present study
Tiphotrephes	common	5	0.037	3	7.5	5	prd	swm	Present study
Hydrometridae						5	prd	ska	Getwongsa (2010)

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
Hydrometra kelantan	rare	1	0.007	1	2.5	5	prd	ska	Present study
Mesoveliidae						5	prd	ska	Morse et al. (1994)
Mesovelia	rare	1	0.007	1	2.5	5	prd	ska	Morse et al. (1994)
Micronectidae						5	prd	swm	Getwongsa (2010)
Micronecta	common	183	1.341	16	40	5	prd	swm	Getwongsa (2010)
Synaptonecta	common	8	0.059	1	2.5	5	prd	swm	Present study
Naucoridae						5	prd	swm	Morse et al. (1994)
Heleocoris	common	10	0.073	7	17.5	5	prd	swm	Getwongsa (2010)
Naucoris	common	155	1.135	24	60	5	prd	swm	Getwongsa (2010)
Nepidae						5	prd	swm	Morse et al. (1994)
Cercotmetus	common	6	0.044	4	10	5	prd	swm	Boonsong (2007)
Ranatra	common	3	0.022	2	5	5	prd	swm	Boonsong (2007)
Notonectidae						5	prd	swm	Morse et al. (1994)
Nychia	common	4	0.029	3	7.5	5	prd	swm	Morse et al. (1994)
Pleidae						5	prd	swm	Morse et al. (1994)
Paraplea	rare	1	0.007	1	2.5	5	prd	swm	Morse et al. (1994)
Veliidae	rare	1	0.007	1	2.5	5	prd	swm	Boonsong (2007)
Rhagovelia	common	71	0.52	19	47.5	5	prd	swm	Somnark (2018)
Xiphovelia	rare	1	0.007	1	2.5	5	prd	swm	Somnark (2018)
LEPIDOPTERA									
Crambidae						5	shr	clg	Morse et al. (1994)
Elophila	common	5	0.037	4	10	5	shr	clg	Somnark (2018)
Eoophyla	common	56	0.41	15	37.5	5	shr	clg	Boonsong (2007)
Paracymoriza	common	21	0.154	9	22.5	5	shr	clg	Morse et al. (1994)
Potamomusa	common	19	0.139	11	27.5	5	scr	clg	Morse et al. (1994)
MEGALOPTERA									
Corydalidae						5	prd	clg	Morse et al. (1994)
Corydalinae	common	54	0.396	21	52.5	5	prd	clg	Morse et al. (1994)

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
ODONATA									
Aeshnidae						5	prd	clm	Morse et al. (1994)
Aeschnophlebia	common	2	0.015	2	5	5	prd	clm	Morse et al. (1994)
Calopterygidae	common	15	0.11	8	20	5	prd	clm	Morse et al. (1994)
Chlorocyphidae						5	prd	clm	Morse et al. (1994)
Rhinocypha	common	9	0.066	8	20	5	prd	clm	Morse et al. (1994)
Coenagrionidae	rare	1	0.007	1	2.5	5	prd	clm	Morse et al. (1994)
Agriocnemis	common	2	0.015	1	2.5	5	prd	clm	Morse et al. (1994)
Cordulegastridae	common	2	0.015	2	5	4	prd	bur	Morse et al. (1994)
Cordulidae						5	prd	spr	Morse et al. (1994)
Cordulia	common	3	0.022	3	7.5	5	prd	spr	Morse et al. (1994)
Euphaeidae	common	13	0.095	4	10	5	prd	clm	Morse et al. (1994)
Euphaea	common	104	0.762	23	57.5	5	prd	clm	Morse et al. (1994)
Gomphidae	common	13	0.095	4	10	5	prd	bur	Morse et al. (1994)
Burmagomphus	common	110	0.806	25	62.5	5	prd	bur	Morse et al. (1994)
Gomphidia	common	3	0.022	3	7.5	5	prd	bur	Morse et al. (1994)
Heliogomphus	rare	1	0.007	1	2.5	5	prd	bur	Morse et al. (1994)
Megalogomphus	common	22	0.161	1	2.5	5	prd	bur	Morse et al. (1994)
Melliogomphus	common	105	0.769	16	40	5	prd	bur	Morse et al. (1994)
Microgomphus	common	2	0.015	1	2.5	5	prd	bur	Morse et al. (1994)
Ophiogomphus	common	121	0.886	21	52.5	5	prd	bur	Morse et al. (1994)
Orientogomphus	common	8	0.059	1	2.5	5	prd	bur	Morse et al. (1994)
Phaenandrogomphus	common	3	0.022	2	5	5	prd	bur	Morse et al. (1994)
Shaogomphus	common	2	0.015	2	5	5	prd	bur	Morse et al. (1994)
Sinogomphus	common	6	0.044	3	7.5	5	prd	bur	Morse et al. (1994)
Stylogomphus	common	7	0.051	4	10	5	prd	bur	Morse et al. (1994)
Trigomphus	common	2	0.015	2	5	5	prd	bur	Morse et al. (1994)
Libellulidae	common	2	0.015	1	2.5	5	prd	spr	Morse et al. (1994)

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
Acisoma	common	2	0.015	2	5	5	prd	spr	Morse et al. (1994)
Brachythemis	common	35	0.256	10	25	5	prd	spr	Morse et al. (1994)
Libellula	rare	1	0.007	1	2.5	5	prd	spr	Morse et al. (1994)
Macrodiplax	common	9	0.066	6	15	5	prd	spr	Morse et al. (1994)
Orthetrum	common	10	0.073	5	12.5	5	prd	spr	Morse et al. (1994)
Pseudothemis	rare	1	0.007	1	2.5	5	prd	spr	Morse et al. (1994)
Sympertrum	common	8	0.059	3	7.5	5	prd	spr	Morse et al. (1994)
Trithemis	common	64	0.469	9	22.5	5	prd	spr	Morse et al. (1994)
Zygonyx	rare	1	0.007	1	2.5	5	prd	spr	Present study
Macromiidae						7	prd	spr	Morse et al. (1994)
Macromia	common	14	0.103	6	15	7	prd	spr	Morse et al. (1994)
Megapodagrionidae	common	7	0.051	4	10	5	prd	clm	Morse et al. (1994)
Protoneuridae						5	prd	clm	Morse et al. (1994)
Prodasineura	common	24	0.176	6	15	5	prd	clm	Morse et al. (1994)
ORTHOPTERA									
Blaberidae	common	6	0.044	4	10	5	sca	clg	Boonsong (2007)
Tridactylidae	common	2	0.015	2	5	5	shr	ska	Getwongsa (2010)
PLECOPTERA									
Nemouridae						2	shr	clg	Boonsong (2007)
Amphinemura	common	22	0.161	4	10	2	shr	clg	Boonsong (2007)
Indonemoura	common	39	0.286	4	10	1	shr	clg	Boonsong (2007)
Nemoura	rare	1	0.007	1	2.5	1	shr	clg	Morse et al. (1994)
Protonemura	common	3	0.022	1	2.5	1	shr	clg	Morse et al. (1994)
Peltoperlidae						1	shr	clg	Boonsong (2007)
Cryptoperla	common	9	0.066	3	7.5	1	shr	clg	Boonsong (2007)
Perlidae						2	prd	clg	Boonsong (2007)
Etrocorema	common	151	1.106	10	25	3	prd	clg	Boonsong (2007)
Neoperla	common	188	1.377	32	80	3	prd	clg	Boonsong (2007)

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
Phanoperla	common	15	0.11	7	17.5	2	prd	clg	Boonsong (2007)
Togoperla	common	20	0.147	8	20	3	prd	clg	Boonsong (2007)
TRICHOPTERA									
Brachycentridae	common	2	0.015	2	5	1	shr	clg	Morse et al. (1994)
Calamoceratidae						1	shr	spr	Morse et al. (1994)
Anisocentropus	common	59	0.432	9	22.5	1	shr	spr	Morse et al. (1994)
Ganonema	common	17	0.125	5	12.5	1	shr	spr	Morse et al. (1994)
Dipseudopsidae						6	fil	bur	Morse et al. (1994)
Pseudoneureclipsis	common	43	0.315	14	35	6	fil	bur	Morse et al. (1994)
Ecnomidae						5	col	clg	Morse et al. (1994)
Ecnomus	common	5	0.037	4	10	5	col	clg	Morse et al. (1994)
Glossosomatidae						1	scr	clg	Morse et al. (1994)
Agapetus	common	2	0.015	2	5	1	scr	clg	Morse et al. (1994)
Glossosoma	common	11	0.081	3	7.5	1	scr	clg	Morse et al. (1994)
Goeridae						1	scr	clg	Morse et al. (1994)
Goera	common	2	0.015	1	2.5	1	scr	clg	Morse et al. (1994)
Hydopsychidae						5	fil	clg	Morse et al. (1994)
Amphipsyche	common	30	0.22	12	30	4	fil	clg	Morse et al. (1994)
Cheumatopsyche	abundant	749	5.487	35	87.5	7	fil	clg	Morse et al. (1994)
Diplectrona	common	39	0.286	7	17.5	2	fil	clg	Morse et al. (1994)
Hydropsyche	abundant	368	2.696	28	70	6	fil	clg	Morse et al. (1994)
Macrostemum	common	42	0.308	13	32.5	6	fil	clg	Morse et al. (1994)
Oestropsyche	common	17	0.125	6	15	6	fil	clg	Rattanachan (2017)
Polymorphanisus	common	5	0.037	3	7.5	5	fil	clg	Morse et al. (1994)
Potamyia	abundant	718	5.26	22	55	4	fil	clg	Morse et al. (1994)
Pseudoleptonema	common	24	0.176	8	20	3	fil	clg	Boonsoong (2007)
Trichomacronema	common	2	0.015	2	5	5	fil	clg	Uttaruk (2011)
Hydroptilidae						6	scr	clg	Morse et al. (1994)

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
Hydroptila	common	9	0.066	4	10	6	scr	clg	Morse et al. (1994)
Orthotrichia	common	53	0.388	15	37.5	5	scr	clg	Wiggins (1996)
Stactobiella	rare	1	0.007	1	2.5	5	shr	clg	Morse et al. (1994)
Lepidostomatidae						1	shr	clg	Morse et al. (1994)
Lepidostoma	common	3	0.022	2	5	1	shr	clg	Morse et al. (1994)
Leptoceridae						6	col	clg	Morse et al. (1994)
Leptocerus	common	32	0.234	5	12.5	5	shr	swm	Morse et al. (1994)
Oecetis	common	18	0.132	9	22.5	5	prd	clg	Morse et al. (1994)
Setodes	common	61	0.447	19	47.5	5	col	clg	Morse et al. (1994)
Triplectides	rare	1	0.007	1	2.5	1	shr	clm	Getwongsa (2010)
Ylodes	common	2	0.015	2	5	3	shr	clm	Merritt et al. (2008)
Odontoceridae						4	scr	bur	Wiggins (1996)
Marilia	common	225	1.648	24	60	4	scr	bur	Wiggins (1996)
Psilotreta	common	4	0.029	1	2.5	2	scr	bur	Morse et al. (1994)
Philopotamidae						3	fil	clg	Morse et al. (1994)
Chimarra	Abundant	356	2.608	27	67.5	4	fil	clg	Morse et al. (1994)
Polycentropodidae						5	fil	clg	Morse et al. (1994)
Polycentropus	common	2	0.015	2	5	5	fil	clg	Morse et al. (1994)
Psychomyiidae						4	scr	clg	Morse et al. (1994)
Paduniella	common	6	0.044	3	7.5	2	col	clg	Rattanachan (2017)
Psychomyia	common	4	0.029	2	5	2	col	clg	Uttaruk (2011)
Tinodes	common	2	0.015	2	5	4	scr	clg	Morse et al. (1994)
Stenopsychidae						3	fil	clg	Boonsoong (2007)
Stenopsyche	common	195	1.428	15	37.5	3	fil	clg	Boonsoong (2007)
Xiphocentronidae	common	2	0.015	2	5	5	scr	clg	Wiggins (1996)

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
MOLLUSCA									
GASTROPODA									
MESOGASTROPODA									
Bithynidae						8	scr	spr	Boonsoong (2007)
Bithynia	common	4	0.029	1	2.5	8	scr	spr	Boonsoong (2007)
Hydrobiidae						8	scr	spr	Boonsoong (2007)
Lacunopsis	common	109	0.798	4	10	8	scr	spr	Boonsoong (2007)
Pachydrobiella	common	4	0.029	1	2.5	8	scr	spr	Present study
Lymnaeidae						8	scr	spr	Boonsoong (2007)
Lymnaea auricularia	common	79	0.579	9	22.5	8	scr	spr	Boonsoong (2007)
Pilidae						8	scr	spr	Getwongsa (2010)
Pila	common	3	0.022	1	2.5	8	scr	spr	Getwongsa (2010)
Planorbidae						8	scr	spr	Boonsoong (2007)
Indoplanorbis exustus	common	2	0.015	2	5	8	scr	spr	Boonsoong (2007)
Stenothyridae						5	und	und	Present study
Stenothyra	common	88	0.645	10	25	5	und	und	Present study
Thiaridae						8	scr	spr	Boonsoong (2007)
Melanoides tuberculata	common	5	0.037	3	7.5	8	scr	spr	Boonsoong (2007)
Paracrostoma pseudosulcospira	common	9	0.066	3	7.5	8	scr	spr	Uttaruk (2011)
Tarebia granifera	common	7	0.051	4	10	8	scr	spr	Present study
Thiara scabra	common	21	0.154	9	22.5	8	scr	spr	Rattanachan (2017)
Viviparidae						8	scr	spr	Boonsoong (2007)
Filopaludina	common	2	0.015	2	5	8	scr	spr	Present study
PELECYPODA									
UNIONOIDA									
Amblemidae						7	fil	bur	Boonsoong (2007)
Harmandia munensis	common	2	0.015	1	2.5	7	fil	bur	Present study
Physunio	common	13	0.095	2	5	7	fil	bur	Present study

Table S2. *Cont.*

Final ID	Status	No. of individual	Percent abundant	No. sites where taxon was occurred	Percent occurrence	TolVal*	FFGs*	Habits*	Source*
VENEROIDA									
Corbiculidae						8	fil	bur	Boonsoong (2007)
Corbicula	common	47	0.344	13	32.5	8	fil	bur	Boonsong (2007)
		13,651	**100**	**40**	**100**				
Total order		**17**							
Total families		**102**							
Total genera		**241**							

(Abbreviations: col = collector; fil = filterer; prd = predator; sca = scavenger; scr = scraper; shr = shredder; und = unidentified, bur = burrower; clg = clinger; clm = climber; ska = skater; spr = sprawler; swm = swimmer)

Table S3. Pearson's correlation analysis between candidate metrics of benthic macoinvertebrates in the reference sites.

Metric	Total taxa	EPT taxa	Ephemeroptera taxa	Trichoptera taxa	EPTC taxa	%Diptera	%Plecoptera	Intolerant taxa
EPT taxa	**0.950****							
Ephemeroptera taxa	0.052	0.132						
Trichoptera taxa	**0.897****	**0.921****	-0.257					
EPTC taxa	**0.979****	**0.975****	0.226	**0.855***				
%Diptera	0.063	-0.067	0.568	-0.281	0.098			
%Plecoptera	0.426	0.468	-0.565	0.691	0.349	-0.414		
Intolerant taxa	0.728	0.817*	-0.269	**0.893****	0.711	-0.372	0.509	
%Tolerant	-0.190	-0.045	**0.861***	-0.362	-0.016	0.585	-0.512	-0.234
BeckBI	**0.904****	**0.873***	-0.267	**0.957****	0.840*	-0.071	0.599	**0.863***
HBI	0.175	0.215	**0.869***	-0.108	0.307	0.796*	-0.422	-0.138
%Intolerant	0.105	0.216	-0.597	0.424	0.063	**-0.878****	0.667	0.466
Filterers taxa	0.842*	0.779*	-0.352	**0.913****	0.751	-0.150	0.634	0.715
Clingers taxa	0.830*	0.662	-0.415	0.787*	0.704	-0.053	0.450	0.636
%Sprawlers	0.063	0.354	0.542	0.154	0.237	-0.127	-0.032	0.334
%Burrowers	0.567	0.508	0.675	0.234	0.636	0.809*	-0.209	0.128

Metric	%Tolerant	BeckBI	HBI	%Intolerant	Filterers taxa	Clingers taxa	%Sprawlers
BeckBI	-0.324						
HBI	**0.875****	-0.007					
%Intolerant	-0.606	0.219	-0.785*				
Filterers taxa	-0.471	**0.937****	-0.104	0.206			
Clingers taxa	-0.617	**0.859***	-0.238	0.200	0.849*		
%Sprawlers	0.671	0.025	0.455	0.076	-0.115	-0.430	
%Burrowers	0.566	0.372	**0.867***	-0.671	0.247	0.254	0.188

Marked Correlation are significant * $p < 0.05$, ** $p < 0.01$

Table S4. Spearman's correlation coefficients among the eleven core metrics, environmental variables and grian sizes.

Environmental variables	Total taxa	EPT taxa	Ephemeroptera taxa	%Diptera	%Plecoptera	%Tolerant	BeckBI	%Intolerant	Filterer taxa	%Sprawlers	%Burrowers
EC	-0.318*	-0.667**	-0.346*	0.590**	-0.327*	0.479**	-0.528**	-0.505**	-0.547**	-0.012	0.476**
TDS	-0.321*	-0.680**	-0.374*	0.597**	-0.332*	0.478**	-0.541**	-0.515**	-0.572**	0.019	0.500**
NO_3-N	-0.075	-0.207	0.005	0.255	0.049	0.368*	-0.253	-0.166	-0.496**	0.373*	0.428**
THS	0.413**	0.416**	0.025	-0.295	0.308	-0.734**	0.685**	0.576**	0.602**	-0.410**	-0.576**
Boulder	0.364*	0.430**	-0.057	-0.399*	0.483**	-0.462**	0.527**	0.667**	0.636**	-0.149	-0.445**
Cobble	0.189	0.246	-0.074	-0.180	-0.005	-0.342*	0.269	0.195	0.376*	-0.425**	-0.401*
Pebble	0.419**	0.260	-0.076	0.075	0.260	-0.592**	0.533**	0.473**	0.439**	-0.297	-0.228
Gravel	-0.126	-0.156	0.197	0.409**	0.147	0.232	-0.109	-0.097	-0.477**	0.430**	0.411**
Sand	-0.198	-0.092	0.390*	0.198	-0.138	0.285	-0.287	-0.349*	-0.557**	0.470**	0.381*
Detritus	0.059	-0.107	-0.330*	0.378*	0.225	0.072	0.132	0.106	0.042	-0.211	0.123
Muck-Mud	-0.388*	-0.606**	-0.346*	0.292	-0.469**	0.520**	-0.619**	-0.639**	-0.426**	0.032	0.460**

Marked correlations are significant: *$p < 0.05$, **$p < 0.01$.

Table S5. Spearman's correlation between final index scores of Lao MMI and some environmental variables.

	Lao MMI score	THS	EC	TDS
THS	0.610**			
EC	-0.649**	-0.319*		
TDS	-0.647**	-0.331*	0.992**	
NO_3-N	-0.348*	-0.478**	0.387*	0.411**

Marked correlations are significant: *$p < 0.05$, **$p < 0.01$.

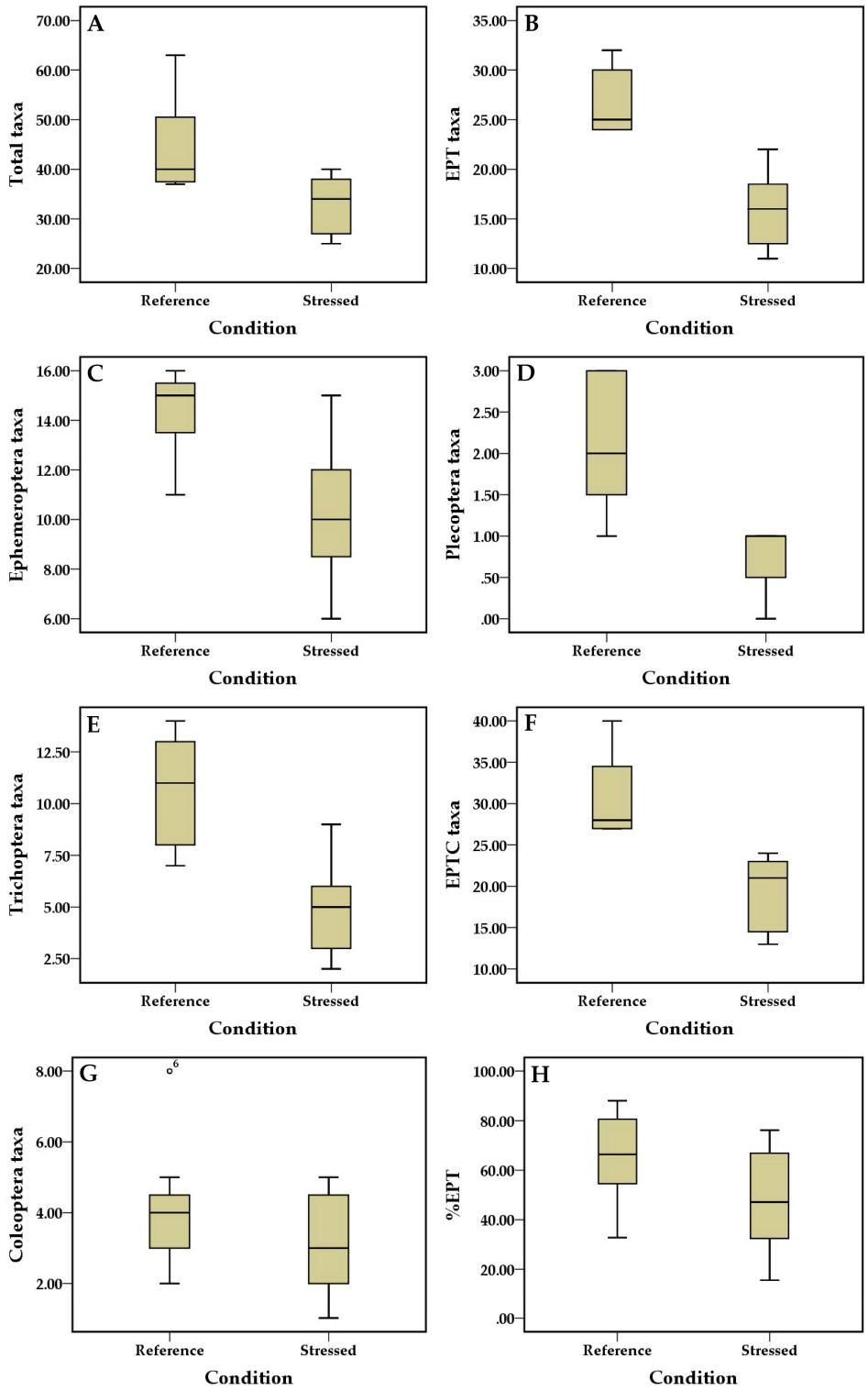

Figure S1. Box and whisker plots of benthic macroinvertebrate metrics to discriminate between reference and stressed sites. A-G richness category: A, total taxa; B, EPT taxa; C, Ephemeroptera taxa; D, Plecoptera taxa; E, Trichoptera taxa; F, EPTC taxa; G, Coleoptera taxa: H-O composition category: H, %EPT.

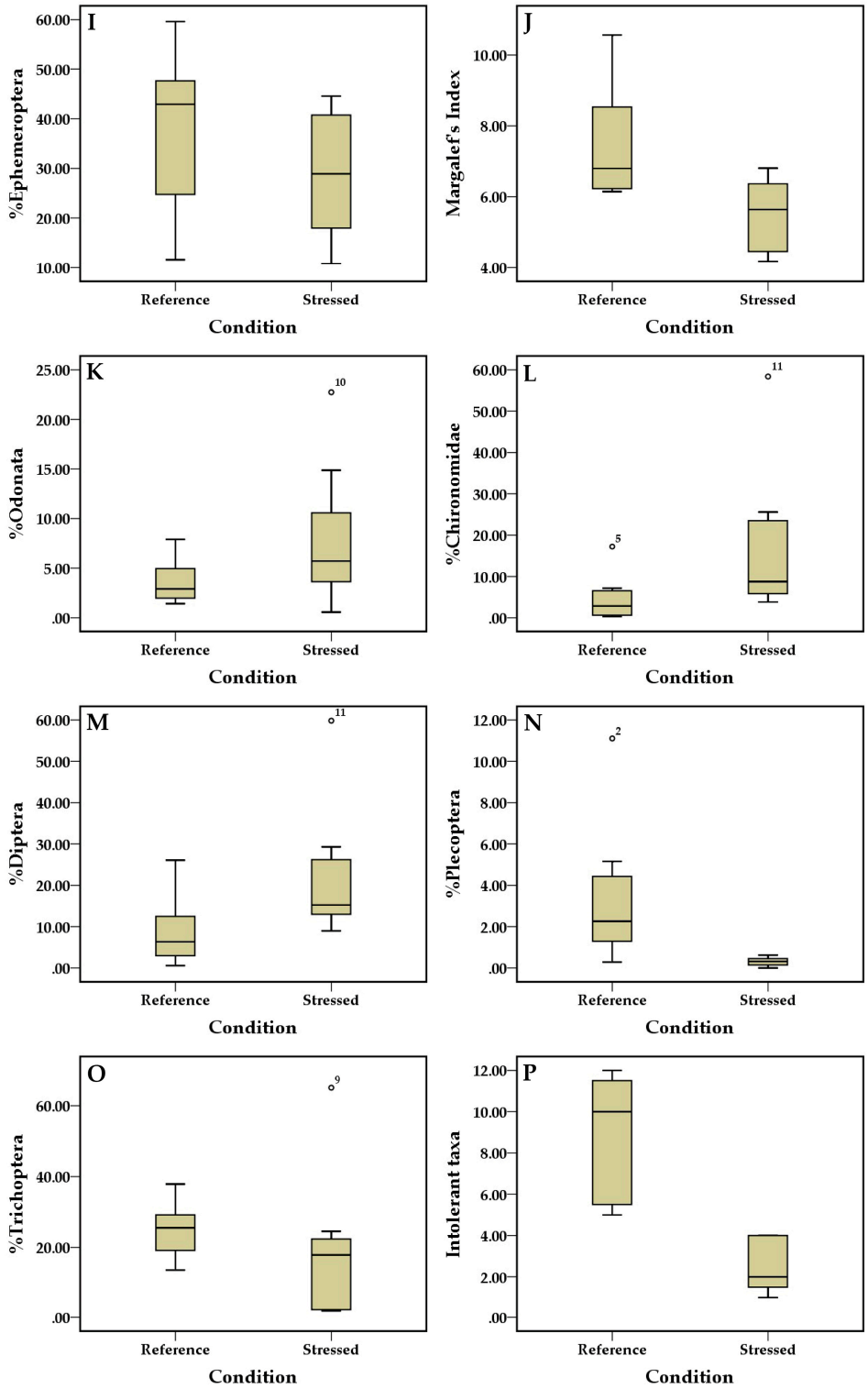

Figure S2. Box and whisker plots of benthic macroinvertebrate metrics to discriminate between reference and stressed sites. H-O composition category: I, %Ephemeroptera; J, Margalef's index; K, %Odonata; L, %Chironomidae; M, %Diptera; N, %Plecoptera; O, %Trichoptera: P-V tolerance/intolerance category: P, Intolerant taxa.

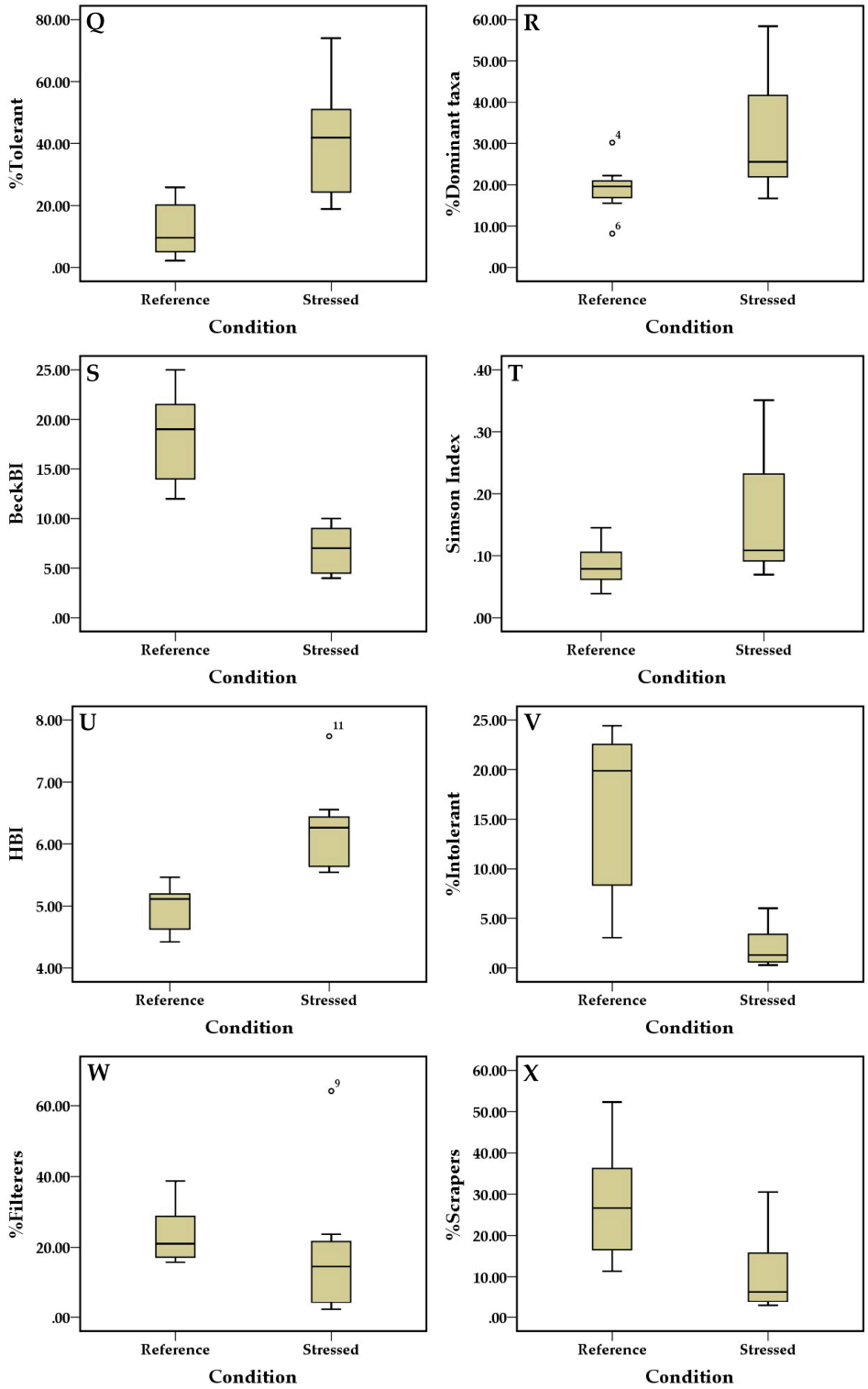

Figure S3. Box and whisker plots of benthic macroinvertebrate metrics to discriminate between reference and stressed sites. P-V tolerance/intolerance category: Q, %Tolerant; R, %Dominant taxon; S, Beck's Biotic Index; T, Simpson Index; U, Hilsenhof's Biotic Index; V, %Intolerant: W-AE functional feeding group category: W, %Filterers; X, %Scrapers.

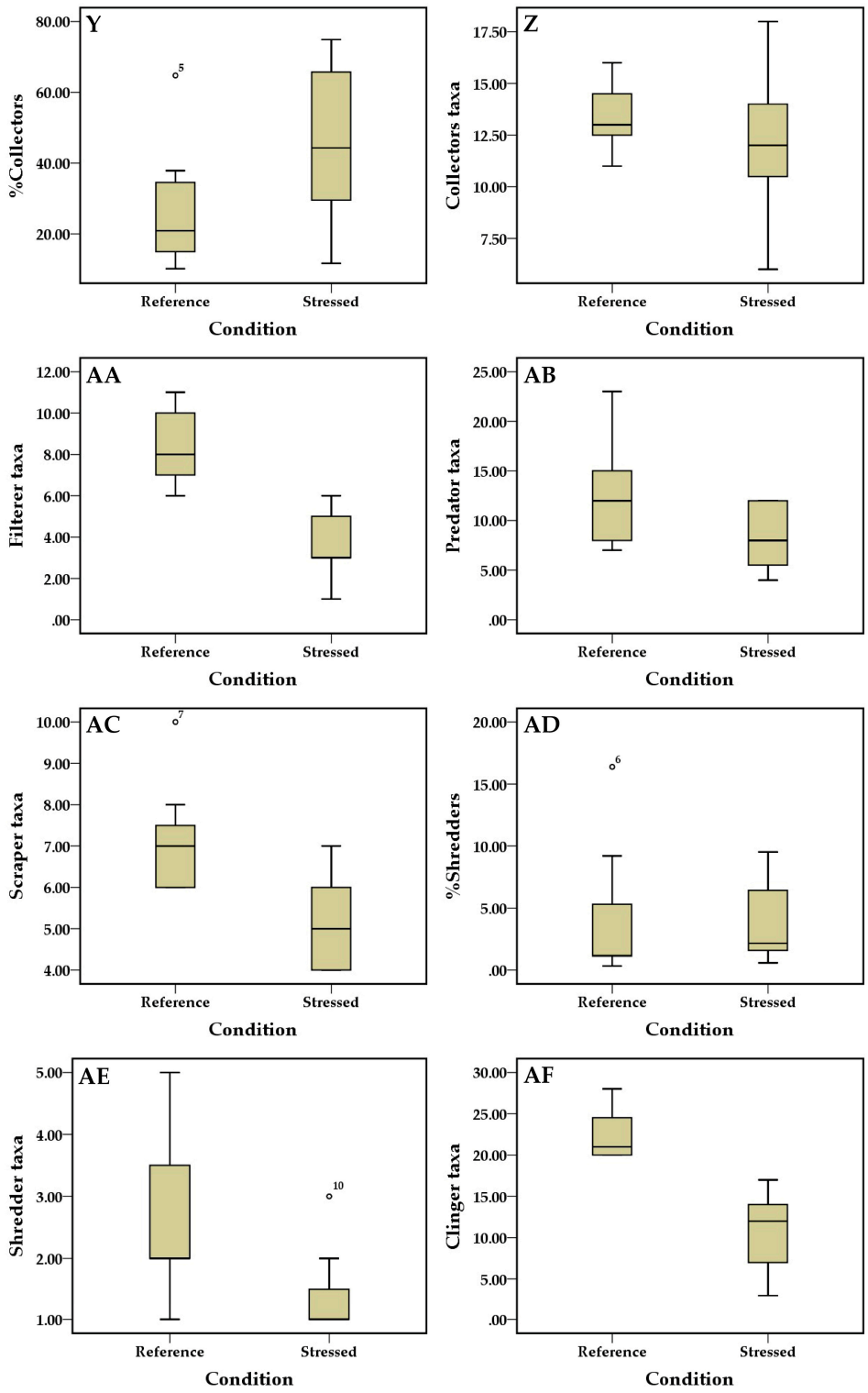

Figure S4. Box and whisker plots of benthic macroinvertebrate metrics to discriminate between reference and stressed sites. W-AE functional feeding group category: Y, %Collectors; Z, Collector taxa; AA, Filterer taxa; AB, Predator taxa; AC, Scraper taxa; AD, %Shredders; AE, Shredder taxa: AF-AI habit category: AF, Clinger taxa.

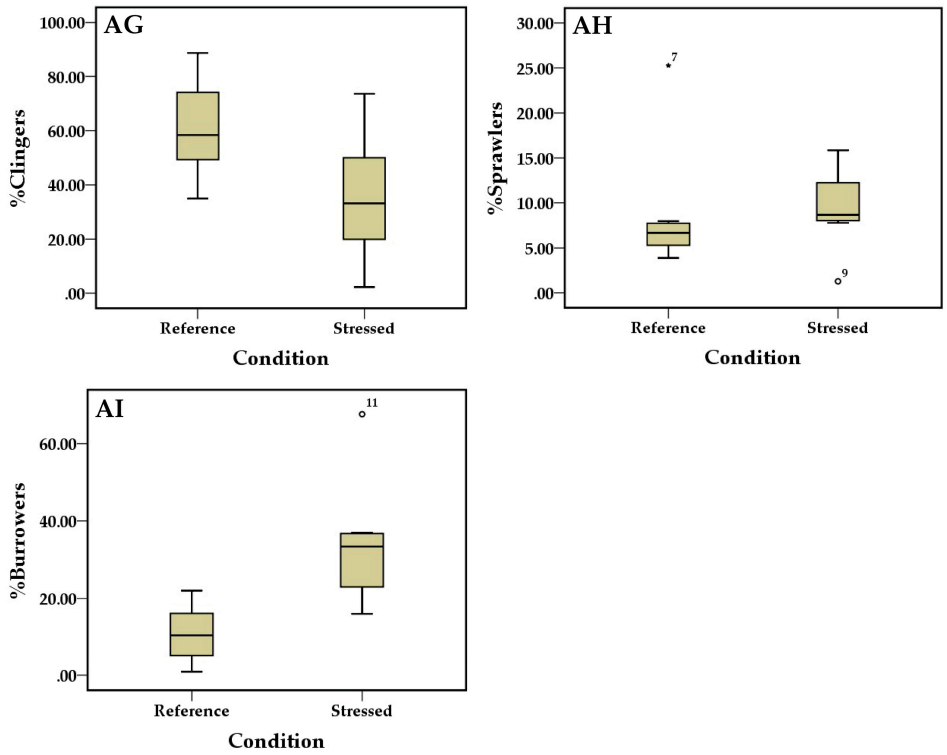

Figure S5. Box and whisker plots of benthic macroinvertebrate metrics to discriminate between reference and stressed sites. AF-AI habit category: AG, %Clingers; AH, %Sprawlers; AI, %Burrowers.