Traits Gap Analysis - Maine

The Maine traits table contains information for 548 OTUs. The majority of the OTUs were at the genera- or genera-group level (94%), 4% family-level and the remaining were order-level or higher. 139 families and 39 higher taxonomic groups (generally order-level) are represented in the Maine dataset. The source of most of the non-temperature traits information was the Traits Matrix (Poff et al. 2006) (**Table 1**). This was mainly supplemented by the USGS traits database (Vieira et al. 2006). Most of the temperature trait information was derived from weighted average calculations that were performed on a subset of the Maine data. Gaps in temperature trait information were mainly filled using the Poff et al. 2006 traits matrix, the USGS traits database (Vieira et al. 2006) and the EPA's 1970s publications. The EPA's 1970s publications were also an important supplemental source of information for rheophily. Most of the habit and functional feeding group information was taken from the Traits Matrix (Poff et al. 2006) and was supplemented mostly by data from the Wadeable Streams Assessment (WSA), Rapid Bioassessment Protocol (RBP2) and the USGS traits database data (Vieira et al. 2006).

Trait information was available for approximately 35-50% of the OTUs (**Table 2**). Exceptions were the habit and functional feeding group traits, for which 83 and 92% of the OTUs had information, respectively. Numerical temperature trait information was available for about 30% of the taxa and categorical temperature trait information (based on rankings and literature) was available for 58% of the taxa.

Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa generally had more trait information than other taxa (**Table 3**). Habit and FFG is available for over 90% of the EPT taxa, categorical temperature trait information is available for 89-94% of the EPT taxa and other trait information is available for about 70-80% of the EPT taxa. A large number of taxa in the Maine dataset are EPT taxa: 72 are Trichopterans, 45 are Ephemeropterans and 34 are Plecopterans. Dipterans (193 taxa), Odonates (35 taxa), and Coleopterans (53 taxa) are also well-represented in the dataset. For the Dipterans and Coleopterans, habit and FFG information is available for 87-96% of the taxa and temperature trait information for 40-45%. Other trait information is available for 23% of the Dipterans and 38% of the Coleopterans. Habit and FFG information is available for 89-97% of the Odonates, while other trait information is available for 71-74% of the taxa. There are a number of orders (or higher level OTUs) that only have FFG information (i.e. Pharyngobdellida, Tubificida, Acariformes, Collembola, Copepoda); most of these OTUs occur in low abundances and are represented by few taxa. In terms of overall abundance in the Maine database, the largest number of individuals in the Maine database are Trichopterans (overall abundance equals 42%), followed by Dipterans (34%), and Ephemeropterans (12%). Amphipods, Plecopterans, Isopods, Coleopterans and Haplotaxida have overall abundances of 1-2%. The remaining 540 OTUs have overall abundances of less than 1%.

SOURCES

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Table 1. Summary of the sources that were used to derive trait information for the Maine traits table. The values equal the # of taxa that the source provided information on. NA equals the number of taxa for which no trait information was available.

Traits	**Sources**								
Life history	**Poff et al. 2006**	**Vieira et al. 2006**	**Zheng (ME) 2008**	**EPA 1970s**	**VT DEC**	**WSA**	**RBP2 1999**	**USEPA Draft 1990**	**NA**
Voltinism	190	80							278
Development	200	9							339
Synchronization of emergence	200								348
Adult life span	198	27							323
Adult ability to exit	200								348
Ability to survive desiccation	200								348
Mobility									
Dispersal (adult)	194	27							327
Adult flying strength	200								348
Occurrence in drift	200								348
Maximum crawling rate	200								348
Swimming ability	200								348
Morphology									
Attachment	200								348
Armoring	192	80							276
Shape	200								348
Respiration	200								348
Size at maturity	192	92							264
Resource acquisition/preference									
Rheophily	194	54		67	4				229
Habit	154	166				127	5		96
Functional feeding group	161	145				159	24	13	46
Temperature									
Temperature optimum			161						387
Temperature tolerance			161						387
Rank of temperature optimum	95	17	161	45					230
Rank of temperature tolerance	95	17	161	45					230
Rank of temperature optimum-tolerance	95	17	161	45					230
Tolerance						390	8	27	123

Table 2. Number and percentage of the 548 total taxa (at the established OTU level) in the Maine database that have trait information.

Traits	# of taxa with trait information	% of taxa with trait information
Life history		
Voltinism	270	49.3
Development	209	38.1
Synchronization of emergence	200	36.5
Adult life span	225	41.1
Adult ability to exit	200	36.5
Ability to survive desiccation	200	36.5
Mobility		
Dispersal (adult)	221	40.3
Adult flying strength	200	36.5
Occurrence in drift	200	36.5
Maximum crawling rate	200	36.5
Swimming ability	200	36.5
Morphology		
Attachment	200	36.5
Armoring	272	49.6
Shape	200	36.5
Respiration	200	36.5
Size at maturity	284	51.8
Resource acquisition/preference		
Rheophily	319	58.2
Habit	452	82.5
Functional feeding group	502	91.6
Temperature		
Temperature optimum	161	29.4
Temperature tolerance	161	29.4
Rank of temperature optimum	318	58
Rank of temperature tolerance	318	58
Rank of temperature optimum-tolerance	318	58
Tolerance	425	77.6

Table 3. Percentage of taxa within each order (or in some cases, higher taxonomic level) that have life history traits information in the Maine traits table.

Order	# of taxa within each order	Abundance (% of Total)	Other Traits (Avg)	Temperature	Habit	FFG	Tolerance
Trichoptera	72	42.3	71.8	90.3	93.1	97.2	83.3
Diptera	193	34.2	23.4	45.1	87	91.7	82.9
Ephemeroptera	45	12.4	80.1	88.9	93.3	95.6	84.4
Amphipoda	4	1.9	26.5	100	100	100	100
Plecoptera	34	1.7	80.1	94.1	91.2	91.2	70.6
Isopoda	1	1.6	29.4	100	100	100	100
Coleoptera	53	1.4	37.5	39.6	96.2	90.6	73.6
Haplotaxida	20	1.1	0	30	40	90	80
Basommatophora	15	0.8	2.7	33.3	73.3	86.7	86.7
Odonata	35	0.5	74.3	71.4	88.6	97.1	82.9
Mesogastropoda	7	0.5	1.7	14.3	42.9	57.1	57.1
Rhynchobdellida	7	0.3	14.3	57.1	28.6	85.7	28.6
Veneroida	4	0.3	10.3	75	75	100	100
Tricladida	4	0.3	0	75	50	50	50
Megaloptera	5	0.2	82.4	80	100	100	80
Trombidiformes	1	0.1	0	100	0	0	0
Lumbriculida	3	0.1	0	66.7	0	33.3	66.7
Hydroida	1	0.1	17.6	100	0	100	100
Arhynchobdellida	3	0	15.7	66.7	66.7	100	33.3
Heterostropha	1	0	0	100	0	100	0
Decapoda	3	0	29.4	33.3	100	100	100
Pharyngobdellida	1	0	0	0	0	100	0
Hoplonemertea	1	0	0	100	0	100	100
Cladocera	1	0	0	0	0	100	100
Tubificida	3	0	0	0	0	66.7	0

Table 3. continued…

Order	# of taxa within each order	Abundance (% of Total)	Other Traits (Avg)	Temp Rank	Habit	FFG	Tolerance
Nemata (phylum)	1	0	0	0	0	100	100
Hemiptera	14	0	52.5	42.9	100	100	64.3
Lepidoptera	1	0	0	0	100	100	100
Veneroidea	1	0	0	0	0	100	100
Acariformes	1	0	0	0	0	100	0
Collembola	4	0	0	0	0	100	0
Aeolosomatida	1	0	23.5	100	0	0	0
Branchiobdellida	2	0	0	0	50	50	50
Neuroptera	1	0	100	100	100	100	100
Copepoda	1	0	0	0	0	100	0
Nematomorpha (phylum)	1	0	0	0	100	100	100
Neotaenioglossa	1	0	0	0	0	100	100
Unionoida	1	0	0	0	100	100	100
Ectoprocta (phylum)	1	0	0	0	0	0	0