Supporting Information

Differences in trait affinities obtained by trait aggregation methods compared to traits assigned at family-level

Comparison of the trait aggregation methods with each other

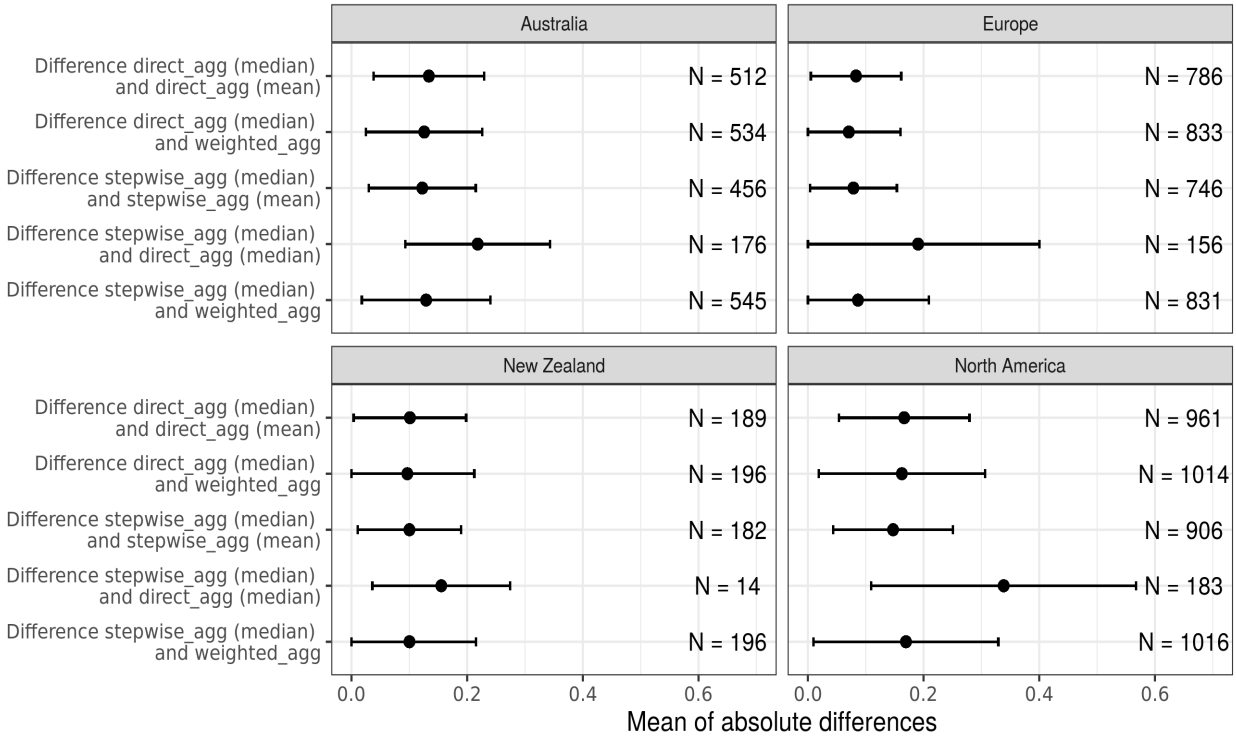

Figure 1: Comparison of trait aggregation methods when aggregating over all traits for all datasets. Displayed are means of absolute differences in trait affinities with standard deviations (truncated at 0). Compared aggregation methods are displayed on the y-axis. N indicates the number of cases where differences occurred. Total number of cases: Australia 2223, Europe 3352, New Zealand 777, and North America 4080.

Taxonomic hierarchy in the trait datasets used for comparisons with assigned traits at family-level

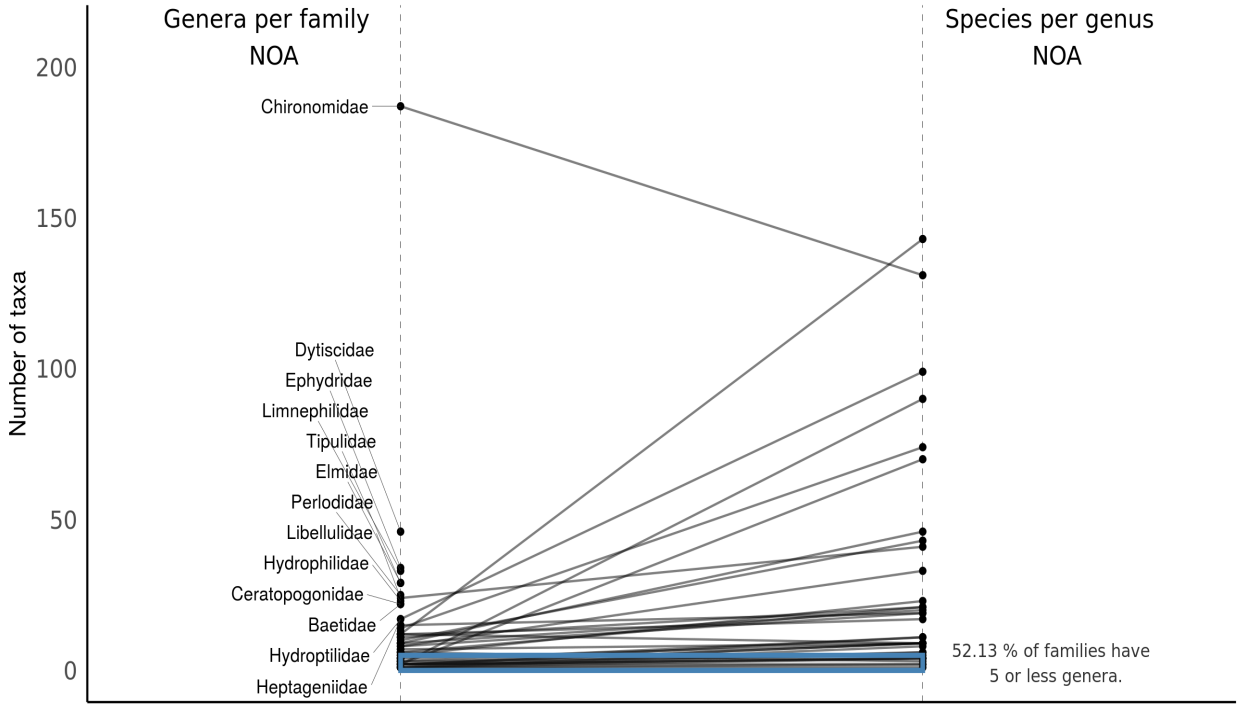

Figure 2: Number of genera per family and species per genus for those families of the North American trait dataset that have been compared to assigned traits at family level. For better visual display only families with more than 15 genera are displayed.

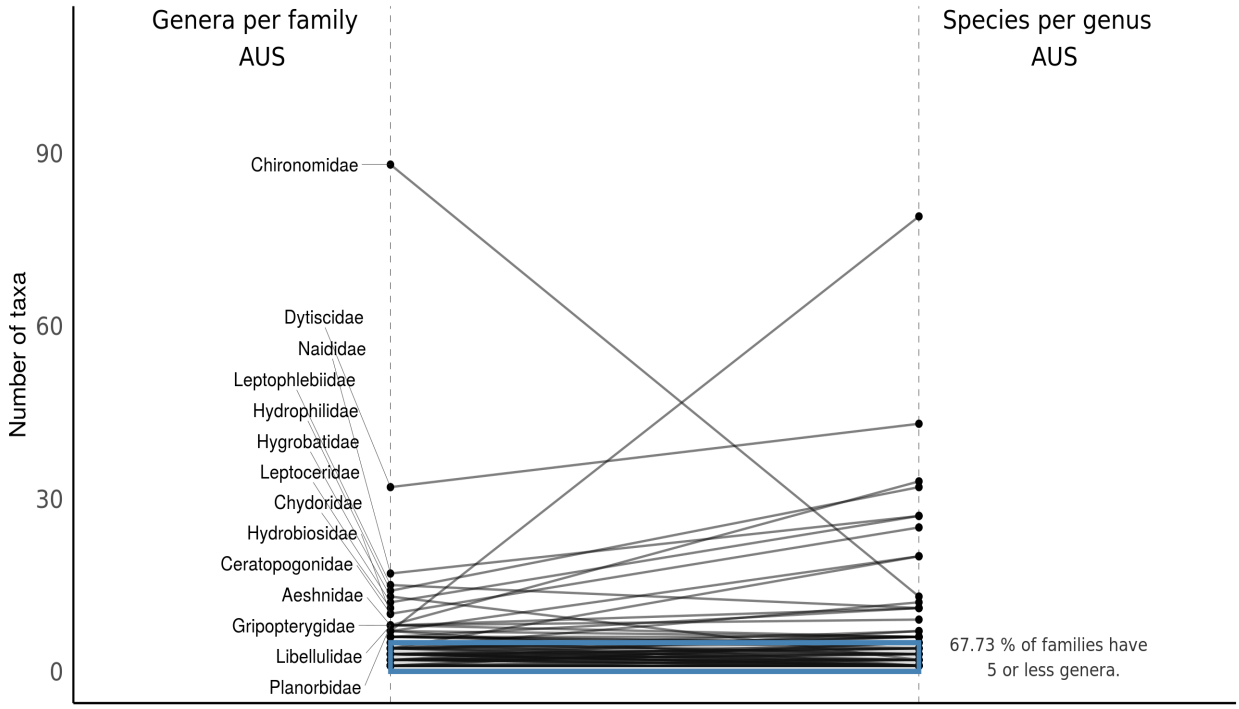

Figure 3: Number of genera per family and species per genus for the Australian trait dataset. For better visual display only families with more than 7 genera are displayed.

Re-analysis of Szöcs et al. using harmonized and aggregated grouping features

Table 1: Mean, median and standard deviation of the traits that were responsive to the salinity gradient in the original study but not when re-analysis with the harmonized dataset trait dataset.

Dataset	Trait	Mean	Median	SD
Stepw_median	Shredder	0.20	0.14	0.25
Stepw_mean	Shredder	0.18	0.12	0.22
Direct_median	Shredder	0.21	0.14	0.25
Direct_mean	Shredder	0.19	0.14	0.22
Weighted	Shredder	0.19	0.14	0.22
Harmonized; not_aggregated	Shredder	0.18	0.12	0.24
Original	Shredder	0.25	0.14	0.32
Stepw_median	Gills	0.30	0.27	0.32
Stepw_mean	Gills	0.29	0.22	0.32
Direct_median	Gills	0.30	0.30	0.32
Direct_mean	Gills	0.30	0.30	0.32
Weighted	Gills	0.30	0.30	0.32
Harmonized; not_aggregated	Gills	0.30	0.25	0.32
Original	Gills	0.28	0.00	0.33
Stepw_median	Short life cycle	0.64	0.75	0.39
Stepw_mean	Short life cycle	0.64	0.79	0.39
Direct_median	Short life cycle	0.67	0.75	0.37
Direct_mean	Short life cycle	0.67	0.79	0.38
Weighted	Short life cycle	0.67	0.79	0.38
Harmonized; not_aggregated	Short life cycle	0.64	0.75	0.40
Original	Short life cycle	0.64	0.75	0.40
Stepw_median	Long life cylce	0.36	0.25	0.39
Stepw_mean	Long life cylce	0.36	0.21	0.39
Direct_median	Long life cylce	0.33	0.25	0.37
Direct_mean	Long life cylce	0.33	0.21	0.38
Weighted	Long life cylce	0.33	0.21	0.38
Harmonized; not_aggregated	Long life cylce	0.36	0.25	0.40
Original	Long life cylce	0.36	0.25	0.40

Discrepancies in trait definitions

Table 2: Comparison of trait definitions between invertebrate trait databases. Only traits that are differently described across databases are listed. The definition is quoted if it enables differences to be identified, otherwise the differences are described. The hyphen indicates a missing trait. Reproduction was captured in multiple grouping features per database. Hence, differences for reproduction have been described in the paper. Body form traits are not different between databases, except that the North America (Vieira) database contains the trait Bluff (blocky) which does not appear in the other databases.

Trait	Freshwater-ecology.info	Tachet	North America (Twardochleb)	North America (Vieira)	Australia	New Zealand
Feeding shredder	"Feed from fallen leaves, plant tissues, CPOM"	"Eat coarse detritus, plants or *animal material*"	• "Shred decomposing vascular plant tissue" • Trait herbivore includes among others insect that shred *living aquatic plants*	Shredder	• Detrivore [a] • Trait herbivore includes among others the trait shredder	Shredders

Feeding predator	"Eating from prey"	• Carvers, engulfers & swallowers • Piercers (plants & animals) are an additional trait	Engulfers ("ingest prey whole or in parts") & piercers ("prey tissues and suck fluids")	Predator	Piercer & engulfer	Predator
Feeding filter-feeder	Distinguishes between active and passive	No distinction between active and passive	No distinction between active and passive	No distinction between active and passive	No distinction between active and passive	No distinction between active and passive
Semivoltine	"One generation in two years"	"Life cycle lasts *at least* two years"	"< 1 generation per year"	"< 1 generation per year"	"< 1 generation per year"	"< 1 reproductive cycle per year"
Multivoltine	"*Three* or more generations per year" [b]	"Able to complete *at least* two successive generations per year"	"> 1 generations per year"	"> 1 generations per year"	• 1-2 generations per year • bi/multivoltine • up to 5 generations per year • up to 10 generations per year	"> 1 reproductive cycles per year"

Locomotion swimming	• Passive movement like floating or drifting (trait swimming/scating) • Active movement (trait swimming/diving) .	• Surface swimmers (over and under the water surface) • Full water swimmers (e.g. Baetidae).	"Adapted for "fish-like" swimming"	Swimmer	Distinguishes swimmer and skater	Swimmers (water column)
Locomotion burrowing	"Burrowing in *soft* substrates or boring in *hard* substrates"	• Burrowing "within the first centimeters of the benthic fine sediment" • Differentiates also the trait interstitial (endobenthic)	"Inhabiting *fine* sediment of streams and lakes"	Burrower	"Moving deep into the substrate and thus avoiding flow"	Burrowers (infauna)
Locomotion sprawling & walking	"Sprawling or walking actively with legs, pseudopods or on a mucus"	-	Sprawling: "inhabiting the surface of floating leaves of vascular hydrophytes or fine sediments"	Sprawler	-	-

Locomotion crawling	-	"Crawling over the bottom substrate"	Defined as crawling on the surface of floating leaves or fine sediments on the bottom	-	Database contains traits crawler, sprawler, climber and clinger.	Crawlers (epibenthic)
Locomotion sessil	Does not distinguish temporarily and permanently attached	Distinguishes temporarily and permanently attached	Does not distinguish temporarily and permanently attached	Does not distinguish temporarily and permanently attached	Distinguishes temporarily and permanently attached	Does not distinguish temporarily and permanently attached
Respiration plastron & spiracle	Plastron and spiracle (aerial) are two separate traits	Definition includes respiration using air stores of aquatic plants	Plastron and spiracle combined into one trait	Distinguishes spiracular gills, plastron, atmospheric breathers and plant breathers	Plastron and spiracle (termed aerial) occur as separate and combined traits. Contains also traits: air (plants), atmospheric, and functional spiracles	Distinguishes plastron and spiracle (termed aerial)
Body size small	-	Multiple size classifications [d]	< 9 mm	< 9 mm	< 9 mm [a;c]	Multiple size classifications [e]
Body size medium	-		9 - 16 mm	9 - 16 mm	9 - 16 mm	
Body size large	-		> 16 mm	> 16 mm	> 16 mm	

a Traits from Botwe et al.
b Contains also bivoltine (two generations per year), trivoltine (three generations per year) and flexible.
c Contains a size trait with numeric size values. Contains also traits classifying size like Tachet and like the North American trait databases.
d Size classifications: $<= 0.25$ *cm,* $> 0.25 - 0.5$ *cm,* $0.5 - 1$ *cm,* $1 - 2$ *cm,* $2 - 4$ *cm,* $4 - 8$ *cm,* > 8 *cm.* No distinction into small, medium and large.
e Size classifications: $> 0.25 - 0.5$ *cm,* $0.5 - 1$ *cm,* $1 - 2$ *cm,* $2 - 4$ *cm,* $4 - 8$ *cm.* No distinction into small, medium and large.