Supporting Information

Comparison of the trait aggregation methods with each other
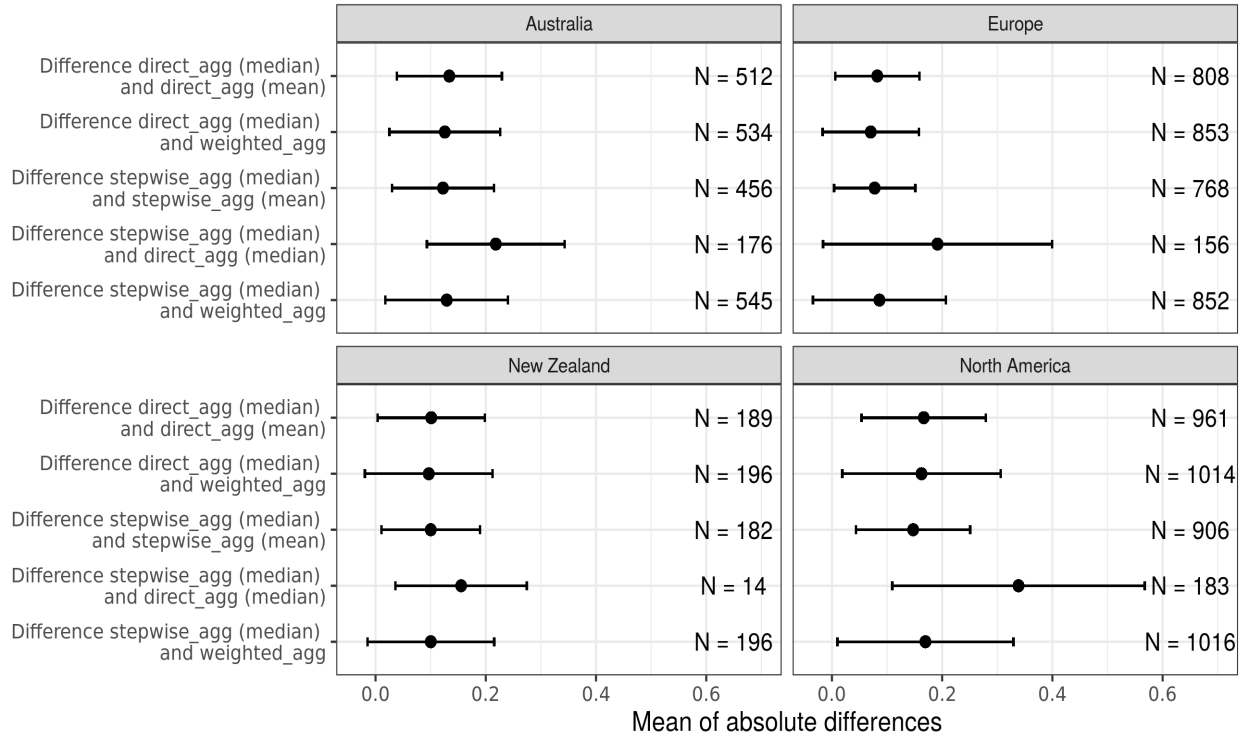

Figure 1: Means of absolute differences in trait affinities with standard deviations per region for all grouping features. Compared aggregation methods are displayed on the y-axis. N indicates the number of cases where differences occurred.

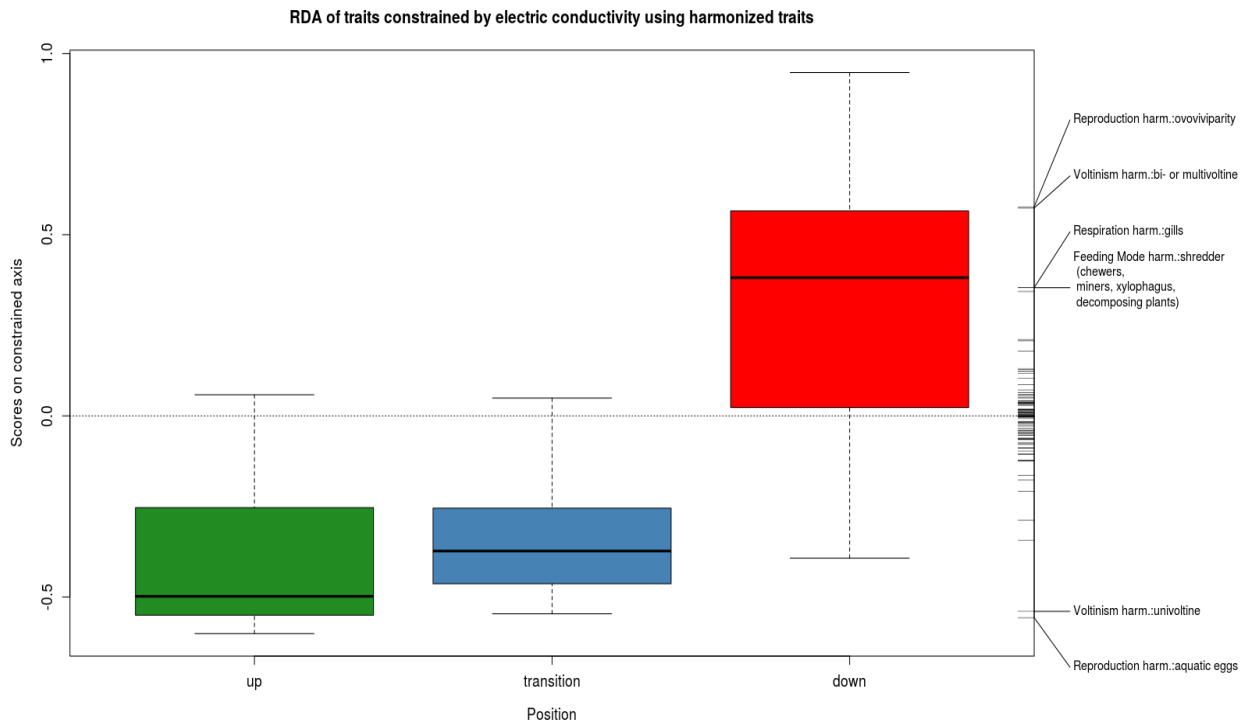# Re-analysis of Szöcs et al. 2014 using harmonized grouping features.

Figure 2: RDA of traits constrained by electric conductivity using harmonized grouping features. Boxplot of site scores along the conductivity axis (31.44% explained variance, p = 0.001, 1000 permutations). Rug on the left indicates trait scores on the conductivity axis. Only traits with a mahalanobis distance greater than 5.02 were labeled in accordance to the procedure in Szöcs et al. 2014.
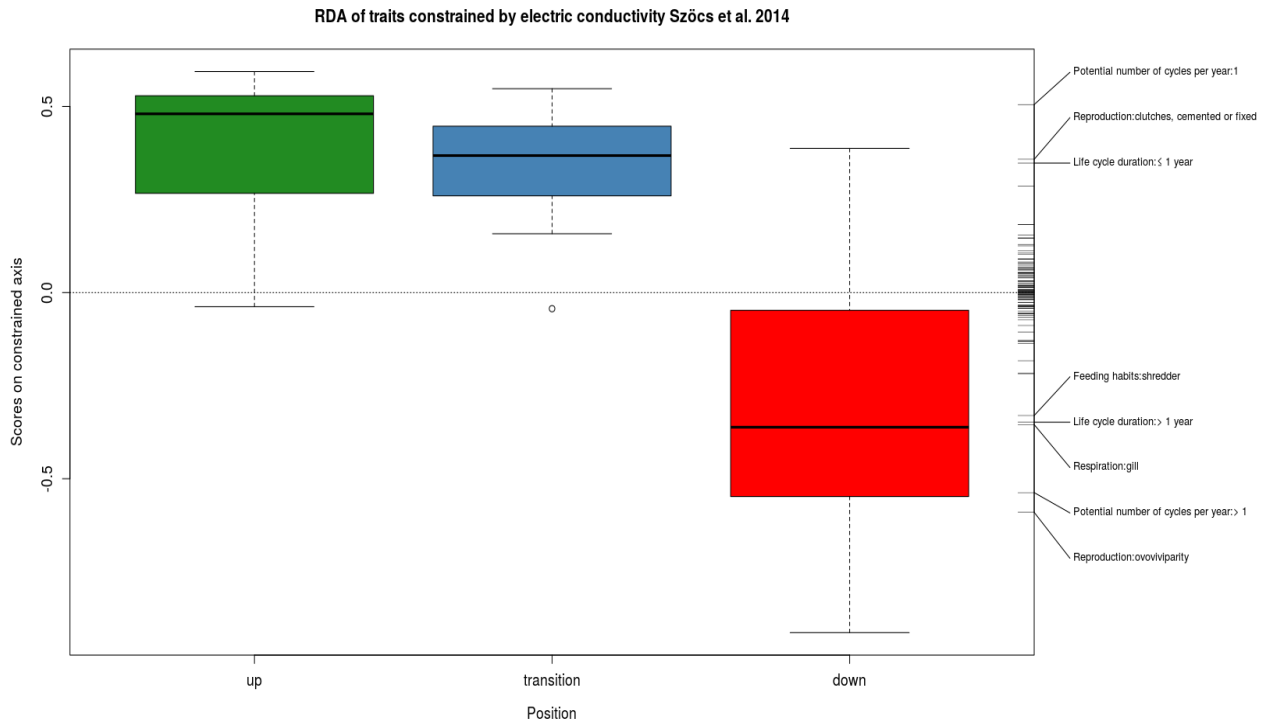
Figure 3: RDA of traits constrained by electric conductivity. Boxplot of site scores along the conductivity axis (30.09% explained variance, p = 0.001, 1000 permutations). Rug on the left indicates trait scores on the conductivity axis. Only traits with a mahalanobis distance greater than 5.02 were labeled.
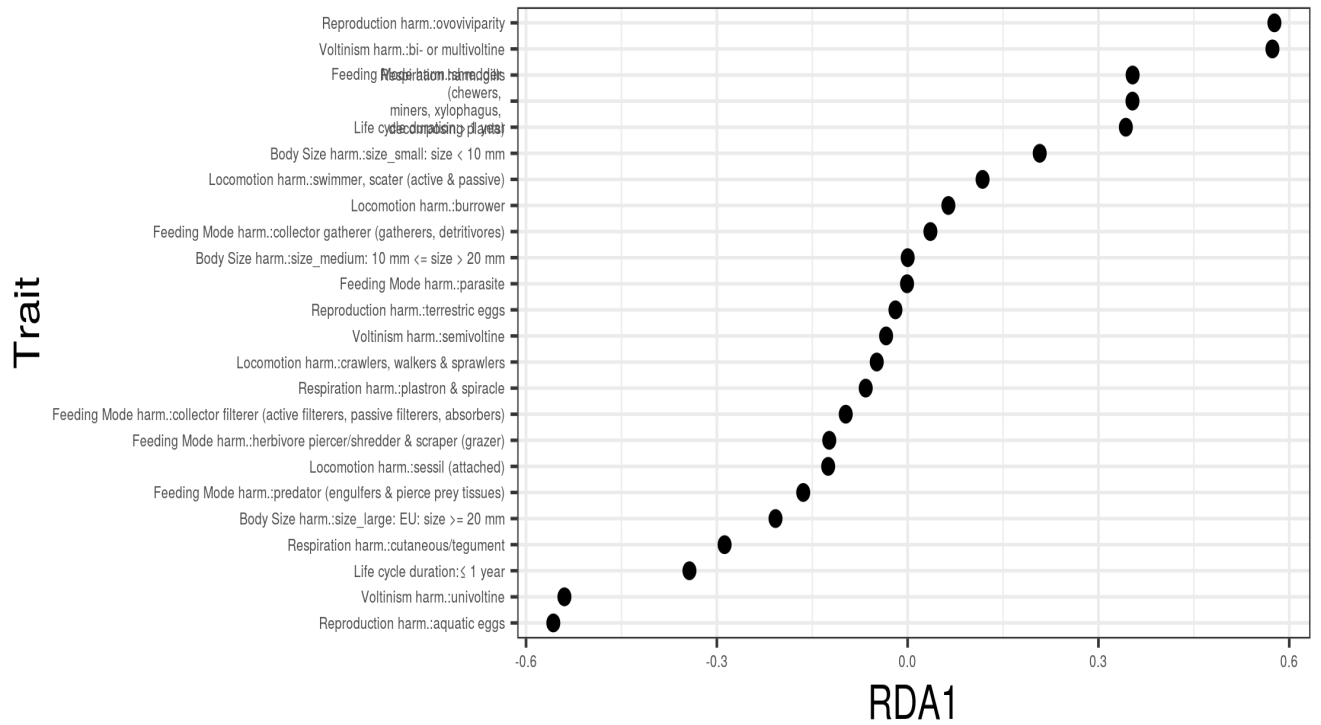
Trait distribution along first RDA axis

Figure 4: Trait scores on the first RDA axis for harmonized traits and traits of the grouping feature *life cycle duration.*
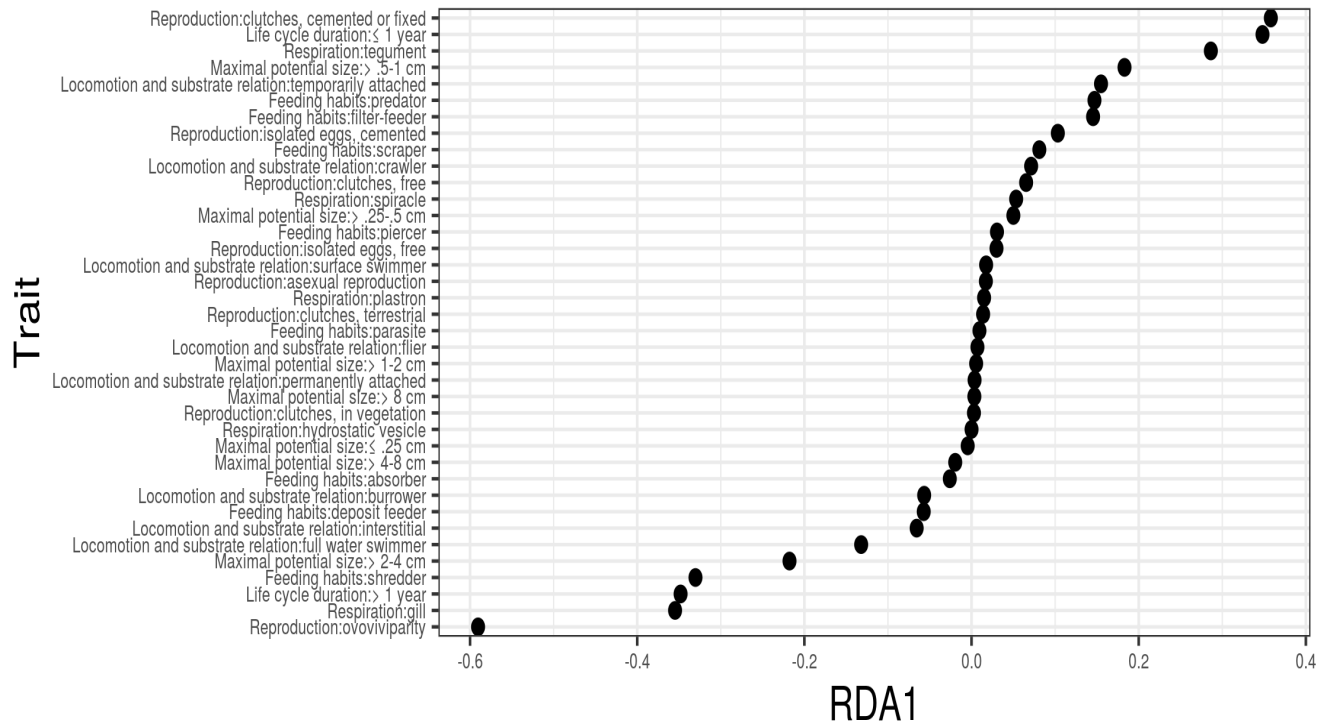
Figure 5: Trait scores on the first RDA axis for the traits responding to high salinity in Szöcs et al. 2014 .

Linear models of trait proportions

Linear models of trait proportions with harmonized traits:

Table 1: Results of linear models for the four selected harmonized traits and life cycle duration > 1 year. Trait proportions were logit transformed prior model building, estimates are on the logit scale. Although years were statistically not significant we kept this factor in the model to avoid temporal autocorrelation. Bold values indicate statistically significant effects (p < 0.05).

	Feeding mode: shredder	Life cycle duration: > 1 year	Voltinism: bi- or multivoltine	Reproduction: ovoviviparity	Respiration: gills
Intercept (= upstream)	**-1.041**	**-0.486**	0.375*	**-0.823**	0.092
Downstream	**0.926**	**0.605**	**1.376**	**1.684**	**0.854**
Downstream x 2008	-0.117	0.106	-0.235	-0.088	-0.317
Downstream x 2009	0.030	-0.056	0.001	0.245	0.180
Year 2008	-0.167	-0.115	0.033	-0.182	-0.151
Year 2009	0.175	0.086	-0.088	0.246	0.141

* p.value = 0.055

Linear models of trait proportions Szöcs et al. 2014:

Table 2: Results of linear models for the five selected traits for Szöcs et al. 2014. Trait proportions were logit transformed prior model building, estimates are on the logit scale. Although years were statistically not significant we kept this factor in the model to avoid temporal autocorrelation. Bold values indicate statistically significant effects (p < 0.05).

|	Feeding habits: shredder	Life cycle duration: > 1 year	Cycles per year: > 1	Reproduction: ovoviviparity	Respiration: gills
Intercept (= upstream)	**-0.853**	**-0.478**	**0.603**	**-0.838**	0.111
Downstream	**0.819**	**0.594**	**1.297**	**1.679**	**0.839**
Downstream x 2008	-0.155	0.102	-0.227	-0.070	-0.314
Downstream x 2009	0.073	-0.053	-0.020	0.248	0.176
Year 2008	-0.122	-0.112	0.026	-0.192	-0.154
Year 2009	0.167	0.084	-0.104	0.250	0.139

Trait proportions over time
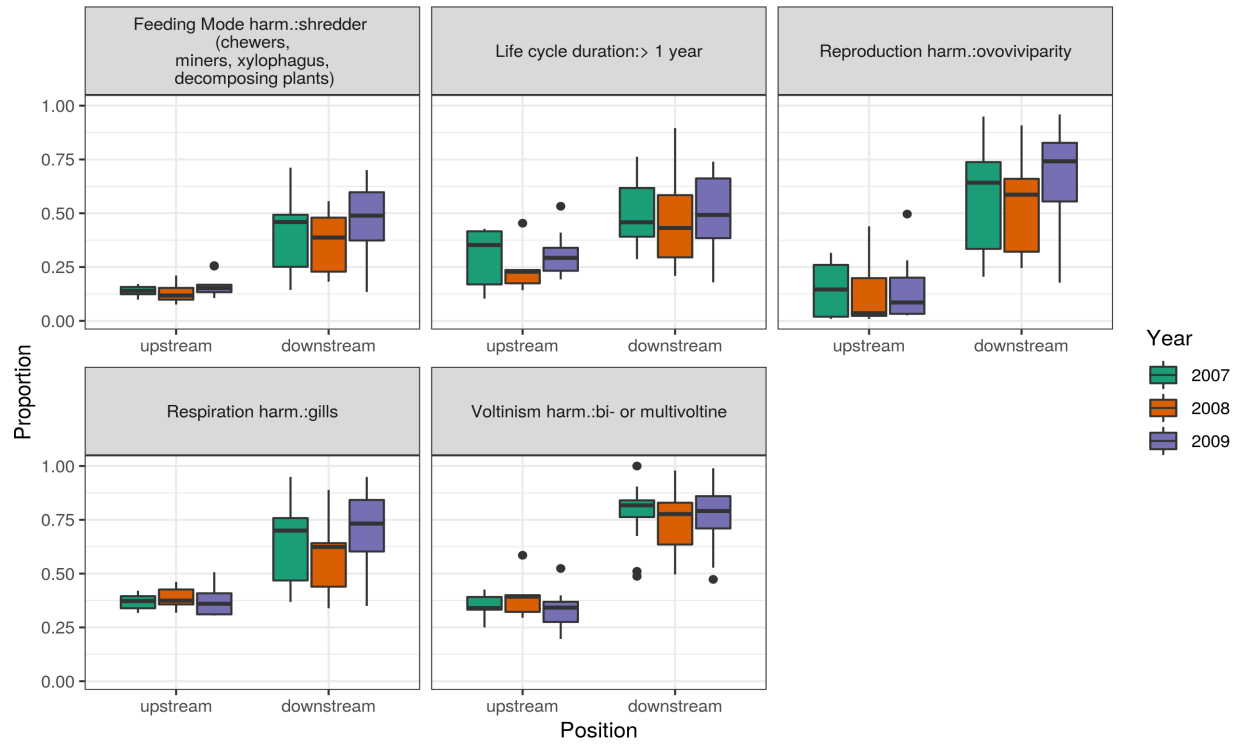
Figure 6: Proportions for the four harmonized traits that have been promoted by salinization and life cycle duration > 1 year for down- and upstream sites.
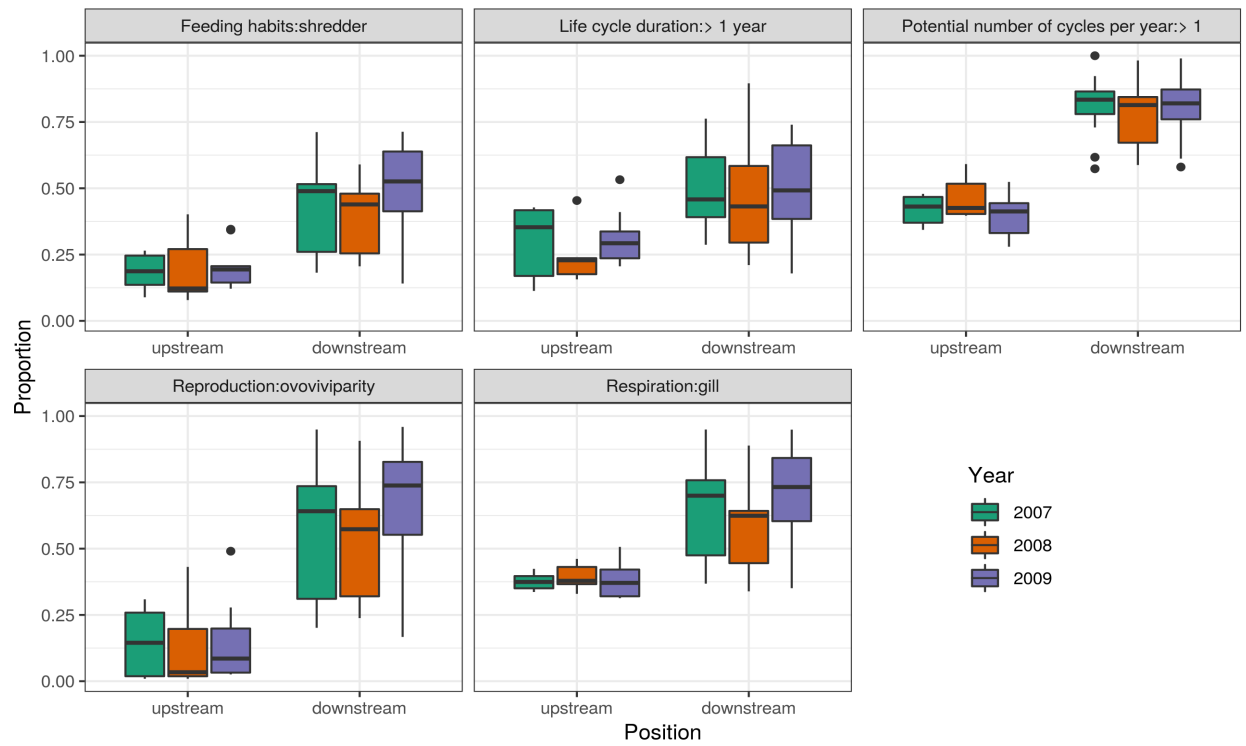
Figure 7: Proportions for five selected traits for down- and upstream sites (traits that have been promoted by salinization) from Szöcs et al. 2014.