

Atkins, R. L., Griffin, J. N., Angelini, C., O'Connor, M. I. and Silliman, B. R. 2015. Consumer–plant interaction strength: importance of body size, density and metabolic biomass. – Oikos doi: 10.1111/oik.01966

## Appendix 1

### Assessing decomposition and standing dead plant material

To more comprehensively understand the interaction between *Littoraria* and *Spartina*, we measured *Littoraria*'s contributions to decomposition and the ability for *Littoraria* to influence aboveground standing dead plant material.

To assay decomposition rate, we added a standardized amount of dead *Spartina* stalk collected from the study site (outside of the enclosures) to each cage at the beginning of the experiment. Specifically, we added three dead stems per cage (mean  $\pm$  SD, 3.8 g  $\pm$  0.42), cut to equal lengths of 30 cm, bound with two cable ties to a thin wire stake, and secured vertically in the centre of each plot (hereafter 'decomposition stick') to simulate standing dead *Spartina* (Hensel and Silliman 2013). After ten weeks, we collected, oven-dried, and re-weighed the decomposition sticks and calculated decomposition as initial – final dry mass of each stick. Total and per capita decomposition were both calculated. Ultimately, aboveground *Spartina* plant material was harvested, separated into living and dead components, oven-dried at 70°C for four days (until stable mass) and weighed. We evaluated the impacts (i.e. interaction strengths) of *Littoraria* on dead *Spartina* material as the natural log-ratio of the treatment compared to the control (Osenberg et al. 1997, Schmitz et al. 2000). Data analysis mirrored that for live *Spartina* material, as detailed in the main text.

Similar to radulation damage, large *Littoraria* contributed to dead plant decomposition more than small individuals, and decomposition increased as a logarithmic function of density, indicating negative density-dependence (Size:  $p = 0.039$ ; Density:  $p = 0.025$ ; Size  $\times$  Density:  $p = 0.82$ ; Supplementary material Appendix 1 Fig. A1).

In contrast to the relationship between live *Spartina* and *Littoraria*, there was no effect of either size or density on dead standing *Spartina* mass (Size:  $p = 0.48$ ; Density:  $p = 0.68$ ). Similarly, there was no effect observed with the interaction strength of *Littoraria* on dead *Spartina* material (Size:  $p = 0.69$ ; Density:  $p = 0.99$ ); examination of the data points, however, indicates that, in the

vast majority of enclosures (26 out of 30) *Littoraria* reduced the standing stock of dead *Spartina* material (Supplementary material Appendix Fig. A2).

These results support the view that *Littoraria* contribute to decomposition and the standing stock of dead plant material. This may also help to explain positive effects of *Littoraria* on aboveground *Spartina* biomass (see Discussion in main text).

## References

- Hensel, M. J. S. and Silliman, B. R. 2013. Cross-kingdom consumer diversity enhances multifunctionality of a coastal ecosystem. – Proc. Natl Acad. Sci. USA 110: 20621–20626.
- Osenberg, C. W. et al. 1997. Effect size in ecological experiments: the application of biological models in meta-analysis. – Am. Nat. 150: 798–812.
- Schmitz, O. et al. 2000. Trophic cascades in terrestrial systems: a review of the effects of carnivore removals on plants. – Am. Nat. 155: 141–153.

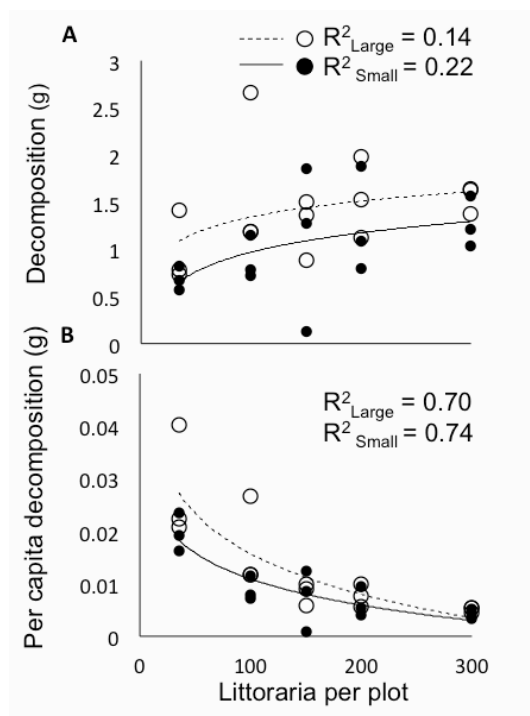


Figure A1. Consumer–plant interaction strengths (based on standing dead *Spartina* plant material at the end of the experiment, see Methods) examined in different ways: first as a function of *Littoraria* density (five levels: 35, 100, 150, 200 or 300) and body size (two levels: small [filled points] or large [hollow points]) (B); and second as a function of total metabolic biomass (see Methods for calculation) (C).

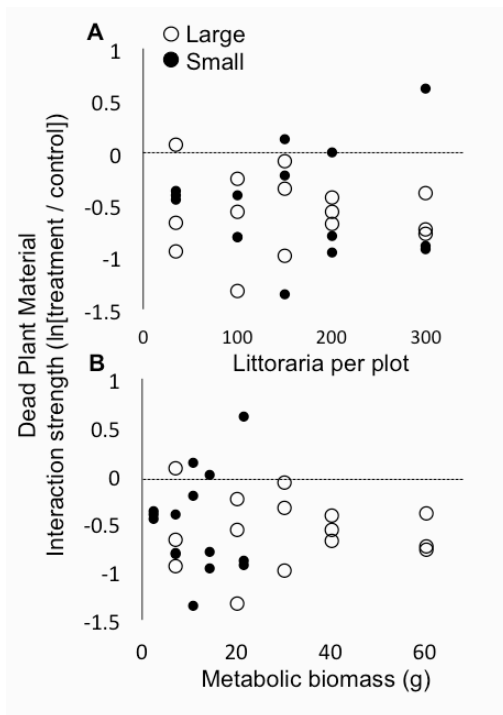


Figure A2. *Littoraria* grazing (i.e., decomposition) as a function of *Littoraria* density (five levels: 35, 100, 150, 200 or 300) and body size (two levels: small or large), expressed as both treatment (A) and per capita (treatment effect / density) effects.