# SEAGRASS WRACK DEGRADATION:

## The effects of wrack diversity and macroinvertebrates on degradation rates in southern WA.

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## Introduction

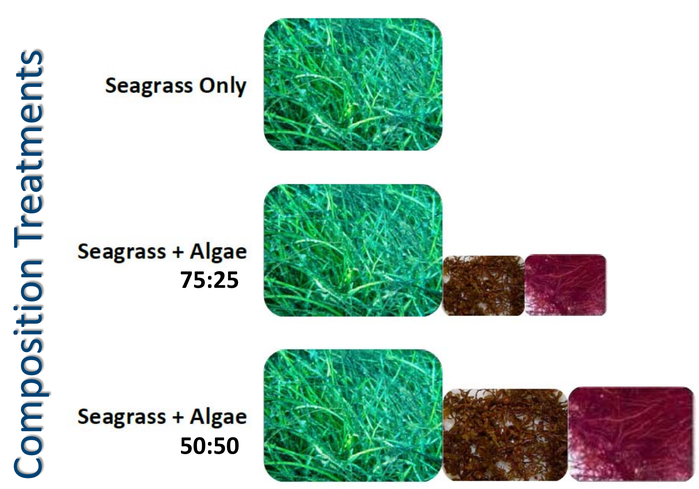
- Seagrass wrack is abundant in temperate Australian sub-tidal ecosystems and the breakdown of this material is essential to recycling nutrients and energy.
- In terrestrial habitats, litter mixture and fauna presence are important factors driving decomposition rates, typically increasing decomposition.
- In temperate marine ecosystems, the rate of litter decomposition in sub-tidal habitats is poorly studied, and the role of fauna and litter mixture in enhancing decomposition (and nutrient recycling) is not well understood.

## Aims

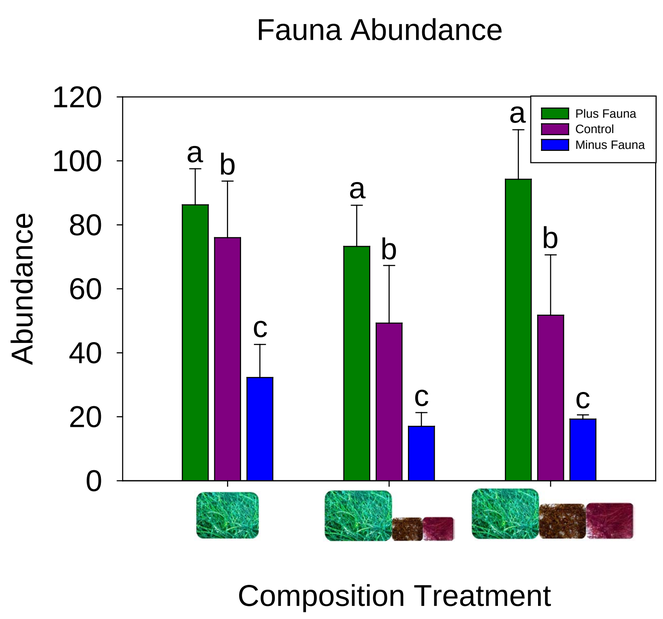
- Investigate whether the presence of macroinvertebrates influences degradation rates of seagrass (*Posidonia sinuosa*) wrack.
- Investigate how increasing wrack diversity (i.e. manipulating abundance and composition) affects degradation rates of *P. sinuosa.*

## Methods

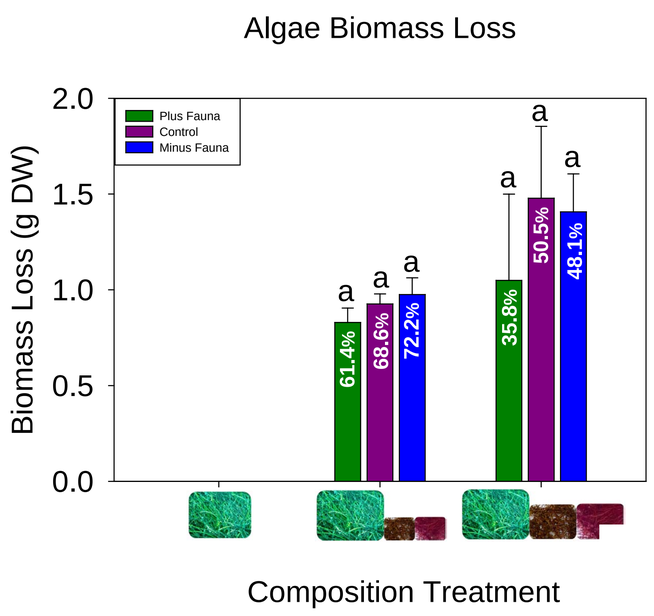
- Subtidal manipulative experiment (31 days).
- Two factor design.
- 3 Fauna treatments X 3 Composition treatments (*n* = 4 for each combination).
- Measured: Loss of biomass; fauna abundance.



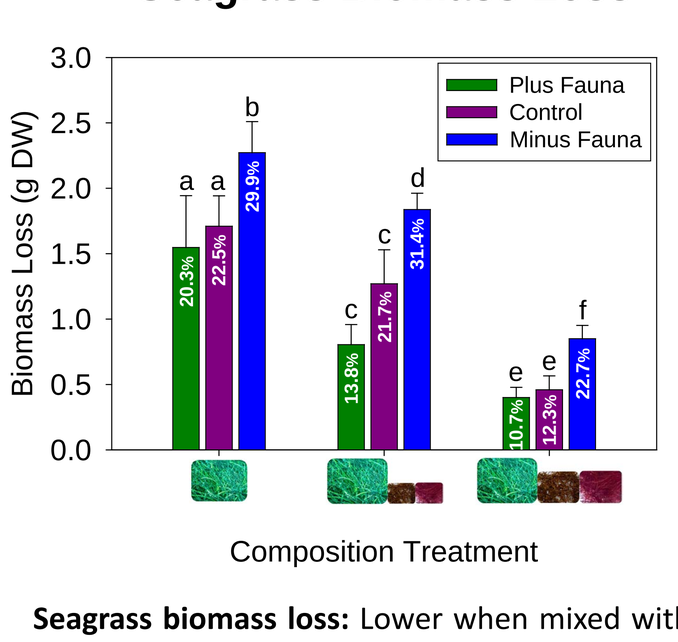

## Results




**Macroinvertebrates:** Less fauna in "Minus Fauna" treatment compared to "Plus Fauna" and "Controls" ($p$<0.01). Treatment was effective in reducing fauna abundance.




**Algal biomass loss:** Similar between composition treatments ($p$=0.54) and among fauna treatments ($p$=0.24). Percent values indicate proportion of algal biomass lost from treatment.




**Seagrass biomass loss:** Lower when mixed with increasing proportions of algae ($p$<0.01) and greater where fauna abundance reduced ($p$<0.01). Percent values indicate proportion of seagrass biomass lost from treatment.

## Conclusions

- The presence of fauna and the mixture of wrack had significant effects on wrack degradation. These were contrary to expectation:
  - The presence of fauna had a negative effect on degradation rates of seagrass, resulting in slower seagrass wrack degradation rates, but did not affect degradation rates of algae.
  - Increasing wrack diversity inhibited seagrass wrack degradation, resulting in significantly slower degradation when a higher proportion of algae was mixed.

## Discussion

- **Terrestrial decomposition dynamics, where fauna and litter diversity enhance decomposition, are not transferrable to this marine ecosystem.**
- **The significant increase in degradation rates at low fauna abundance may be explained by lower grazing pressure on bacteria cells. Bacteria have been identified as an important source of nitrogen for marine macroinvertebrates.**
- **Leaching has been shown to drive biomass loss in the initial stages of decomposition, which may account for the greater proportion of algal biomass loss (high proportion of soluble compounds) compared to more refractory seagrass.**