

Seagrass wrack degradation: Temporal and spatial variations in degradation rates of *Posidonia sinuosa* and the associated processes.

Willison, C. ^{*1}, Lavery, P. ¹ and McMahon, K. ¹

¹ Centre for Marine Ecosystems Research, Edith Cowan University, 270 Joondalup Drive, Joondalup, Western Australia 6027.

*c.willison@ecu.edu.au

Seagrass wrack accumulates in a variety of coastal habitats, potentially providing an important trophic subsidy. Biological, chemical and physical processes degrade wrack, facilitating its entry into detrital food webs or remineralisation. The amount of wrack accumulating is affected by export rates and degradation processes, which may vary significantly throughout the year and among different habitats. In situations where export is disrupted, (e.g.: when structures interfere with long-shore currents), degradation becomes the major means through which wrack is eventually removed, emphasising the importance of understanding degradation dynamics in coastal ecosystems. While many studies have examined degradation of algal wrack, little is understood about the dynamics of seagrass wrack degradation, and what has been studied is largely confined to beach ecosystems, ignoring sub-tidal habitats. This study aimed to determine seagrass wrack degradation rates, specifically investigating how rates vary among beach, surf, unvegetated and vegetated seagrass habitats, and at two seasonally different times of the year. Additionally, it aimed to investigate associations between degradation rates and processes involved, including wave energy, temperature, macroinvertebrate grazing and bacterial decay. *In-situ* litterbag experiments were conducted for sixteen weeks in the summer and winter of 2009/2010. Permutational Analysis of Variance (PERMANOVA) indicated degradation rates varied significantly ($p > 0.05$) between summer and winter and among habitats, however this was site-dependent. Biomass loss was greatest in the surf zone (94.28%; 99.73% summer and winter respectively), followed by vegetated (59.30%; 87.41%), unvegetated (47.74%; 79.55%) and was lowest on beaches (27.66%; 62.99%). Preliminary regression analysis suggests there was no significant association between degradation rates and macroinvertebrate or bacteria abundance, however the significantly higher degradation rates observed in the surf zone and across winter suggest wave energy may be more important for biomass loss. These findings may have profound impact on management approaches in areas where wrack on beaches is simply removed. Options for increasing degradation include promoting movement of wrack between beach and surf habitats, where wrack can remain available for remineralisation and be incorporated into detrital food webs.