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Investigating habitat values of seagrass, macroalgae and wrack in Swan Canning Riverpark

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Background

Seagrass is recognised as an asset in the Swan Canning Riverpark, stabilising sediment and maintaining oxygen levels at the sediment/water interface. The dominant species, *Halophila ovalis*, is also an important food source for the iconic black swan and is thought to support diverse and productive faunal assemblages. However, much of the information about the value of this habitat is gleaned from *Zostera* species in estuaries elsewhere. Very little is known of the biodiversity and ecological value of *Halophila*, which is vastly different in shape and form to *Zostera*.

Macroalgae are commonly found in the lower reaches of the Swan Canning Riverpark in late spring and summer, and in recent years, large amounts of the macroalga *Chaetomorpha linum* have accumulated in shallow embayments. This free-floating macroalga, which is moved by winds and currents, is fast-growing and can respond rapidly to favourable growth conditions. It is often considered a nuisance because it reduces light conditions to *Halophila* seagrass beds and has been shown to affect *Halophila* reproduction.

Large accumulations of algae and seagrass wrack can build up rapidly on beaches, resulting in public complaints and demand for the removal of the accumulated material. Little is known of the value of the wrack to the food-web or its habitat value, either as living algae in the water or as wrack cast on the shoreline.

In this project, the biodiversity and ecological values of *Halophila* meadows and *Chaetomorpha* accumulations in subtidal and nearshore zones were investigated. In addition, the habitat value of accumulated onshore wrack was also explored and the contribution of seagrass and macroalgae to estuarine food-webs was determined.

Photos: Submerged seagrass, *Halophila ovalis* beds (top); accumulated seagrass wrack (middle); and removal of macroalgal wrack (bottom).

Findings

Seine netting was used to investigate the importance of *Halophila* seagrass and *Chaetomorpha* macroalgae to fish communities in subtidal zones, in comparison to areas of bare sand.

Twenty fish species were detected across the three habitat types, but there were very few differences in richness or composition of fish communities across the habitats.

During this investigation, the type of accumulated wrack along shorelines changed from macroalgae dominated in mid spring to seagrass dominated in late summer, following a significant storm event. Seine netting and core samples were used to investigate fish and invertebrate communities in the different nearshore wrack accumulations and compared to bare sand zones.

The species of fish found in the nearshore wrack accumulations and bare sand areas were similar to those in subtidal areas and there were no clear differences in composition between bare sand and wrack habitats.

Wrack along shorelines (both *Chaetomorpha* and *Halophila*) was sampled to determine invertebrate utilisation within and beneath wrack and compared to areas without wrack. Oligochaete worms dominated the invertebrates within and below wrack and in bare sand areas, and there were no significant differences in richness of invertebrates across the habitats (bare sand, wrack or sand beneath wrack) regardless of whether the wrack was seagrass or macroalgae. The abundance and composition of invertebrates did differ across habitats driven by lower densities of multiple taxa in wrack (both seagrass and macroalgae) compared with the sand habitat below it and areas of sand without wrack.

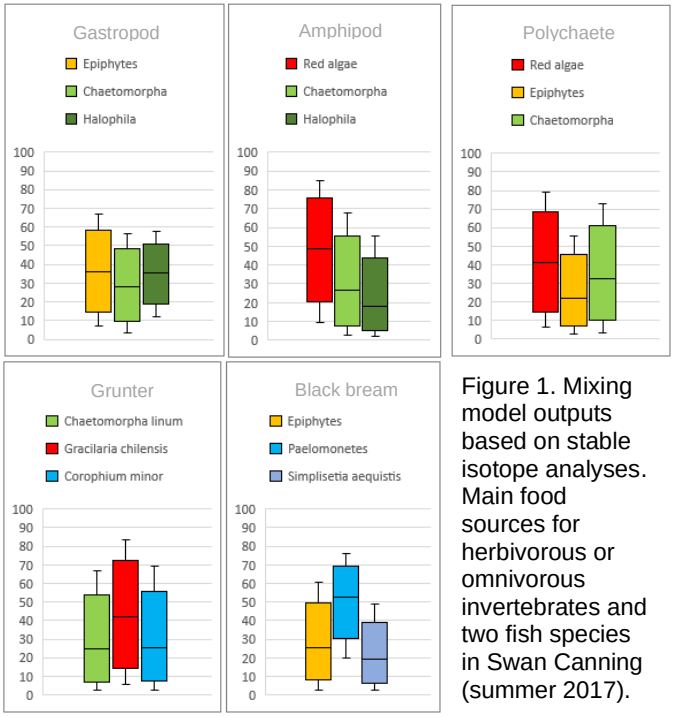

Figure 1. Mixing model outputs based on stable isotope analyses. Main food sources for herbivorous or omnivorous invertebrates and two fish species in Swan Canning (summer 2017).

Stable isotopes analyses (SIA; $\delta^{13}C$ and $\delta^{15}N$) were used to investigate the importance of *Halophila* and *Chaetomorpha* and other autotrophs to the food-web. A mixing model of the SIA applied across fish and invertebrate taxa determined that *Halophila* and *Chaetomorpha*, at best, contribute little as a direct food source for omnivorous fish, but can contribute to the production of invertebrates, most likely via the detrital pathway (Figure 1). Red algae and epiphytes on seagrass appear to form direct food sources.

Management implications

Photo: Seining for fish in seagrass meadows.

Although *Halophila* seagrass in the Swan Canning is known as an important contributor to environmental function, it was not shown in this study to be an important habitat for fish. This may be due to its sparce form and low above-ground biomass. Also, while this seagrass is known to be an important food resource for swans, it appears to provide little direct food resources for fish. *Chaetomorpha* accumulations also had little value as fish habitat or food resource. Neither *Chaetomorpha* nor seagrass appeared to contribute substantially as a direct food resource for invertebrates, but this could occur through detrital pathways.

The removal of seagrass or *Chaetomorpha* wrack from nearshore and onshore areas is therefore unlikely to directly impact fish and invertebrate assemblages. Care should be taken not to disturb sediments beneath the wrack accumulations. In recognition that both *Chaetomorpha* and seagrass wrack contribute to detrital food-webs, the removal of wrack should be limited to localised need and not viewed as a widespread mandate for management.

Further information

Hyndes G, Avenant C and Fulwood S (2020) Investigating habitat values of seagrass, macroalgae and wrack in the Swan Canning Riverpark. Edith Cowan University report to Department of Biodiversity, Conservation and Attractions.