Thesis abstract

Saltmarshes are highly productive ecosystems, serving as habitat for terrestrial and marine fauna and flora, as well as areas of nutrient import and export, flood and erosion control, and carbon sequestration. Despite their importance, studies on the ecology of saltmarshes have been somewhat neglected, especially in southern Australia, and the pollination biology and ecology of saltmarsh plants has been particularly under-studied. This study aims to provide insight into not just the pollination biology and ecology of the two most common, native, insect-pollinated plant species within South Australian saltmarshes, *Frankenia pauciflora* DC. var. *gunnii* Summerh. (Frankeniaceae) and *Samolus repens* (J.R.Forst. & G.Forst.) Pers. (Primulaceae), but also to investigate the effects of introduced plants in the genus *Limonium* Mill. Studies were conducted primarily within the Goolwa saltmarsh in South Australia with a manipulated density study conducted in the Torrens Island saltmarsh. Comparisons were made between the saltmarsh study sites and the Port Elliott cliffs, which had many plant species in common.

Flowering phenologies were examined for both the native *F. pauciflora* and *S. repens* and the introduced *Limonium* at the Goolwa saltmarsh and Port Elliott cliffs, and it was determined that all overlap considerably in their flowering period. A series of experiments was then conducted to examine the interactions between these plant species. Observations of insect floral visitors were conducted and showed that all of the study species were visited by a common group of insect visitors. Floral preferences were determined for the main insect visitors. Syrphids and *Zizina labradus* Godart preferentially selected flowers of *F. pauciflora*, but neither of these two groups, or the introduced *Apis mellifera* L. preferentially visited flowers of *S. repens*. The effects of conspecific and heterospecific floral densities on per-flower visitation rates to *F. pauciflora* and *S. repens* were examined, showing that for both species an increase in conspecific floral density resulted in reduced visitation rates to flowers, suggesting that at high densities, some flowers may not receive sufficient visitation to ensure pollination. An increased floral display of *Limonium* also resulted in lower visitation rates to flowers of *S. repens*. Pollen loads were determined within the

Goolwa saltmarsh and Port Elliott cliffs: while the majority of insects did not carry any measureable pollen, most of the pollen that was detected was that of the introduced *L. hyblaeum* agg.

Pollen limitation experiments were conducted within the Goolwa saltmarsh for the two native study species, and these experiments revealed that both species were pollen-limited during some seasons, and likely to be resource-limited during others. Density studies, both naturally occurring and manipulated, were conducted within the Goolwa saltmarsh and the Torrens Island saltmarsh. These revealed that at a high density, the presence of *Limonium* significantly reduced the fruit set and seed set of *F. pauciflora*. Breeding system studies were then carried out for the two *Limonium* taxa present at the study sites and revealed that both taxa are able to reproduce via apomixis in these South Australian habitats.

Overall, these studies demonstrate that introduced plants in the genus *Limonium* have the capacity to spread clonally and rapidly increase in numbers in South Australian saltmarshes and at high densities, to negatively affect the pollination and reproductive biology of the two most common insect-pollinated native species, *F. pauciflora* and *S. repens*, in these habitats.