# Determining hybrids between invasive and native *Carpobrotus* N.E.Br. species in South Australia: field, morphological and molecular insights

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**Summary** *Carpobrotus edulis* (L.) L.Bolus ssp. *edulis* has been listed in the Metropolitan Adelaide and Northern Coastal Action Plan as a priority environmental weed in the region. This has led to coastal on-ground works targeting *C. edulis* for weed control since 2009. In many of the same areas there are native species of *Carpobrotus*, and putative hybrids have been observed. Taxonomic work, in South Australia, Australia and around the world, has uncovered that there are real difficulties in differentiating native species from hybrids with introduced species.

Plants being used in restoration work, purported to be identified as the native species, *C. rossii* (Haw.) Schwantes, may potentially be hybrid material between the introduced and native species (*C. edulis* × *C. rossii*). Ultimately there is a significant concern that hybrids have become incorporated into restoration plantings. If so, this will be an issue for seed collectors and growers of plant materials used for restoration programs.

Our project has expanded the detailed understanding of *Carpobrotus* taxonomy, formulated by Hellmut Toelken for all of the Australian taxa, by utilising a molecular genetic approach to identify hybrids among populations and species in representative material from South Australia. We detected an extremely high-level of hybridisation among native and introduced *Carpobrotus* from the Adelaide area using a ddRAD Next Generation Sequencing approach. Back-crossing between hybrids and parental types was also detected. A revised taxonomy is being developed to support the ongoing identification of hybrids in the Adelaide region, however hybridisation is likely to be occurring on a larger spatial scale.

**Keywords** *Carpobrotus*, molecular detection, Next Generation Sequencing, hybridisation, introgression, South Australia, taxonomy.