CONFUSION WITH *CARPOBROTUS* ON PERTH'S BEACHES

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This report arose because of concerns from members of SNEC (Stirling Natural Environment Coastcare) about the identification of planted materials of *Carpobrotus virescens* in their rehabilitation zones and the difficulty they experienced in differentiating between the native species and the weed (*C. edulis*).

Hopefully this report will aid in differentiating between the native and the weed and hybrid materials for both collectors and rehabilitation practitioners.

A note of caution, most coastal native *Carpobrotus* species are dioecious unlike the weeds, however different species are involved on the beaches north of Geraldton (*Carpobrotus* "candidus") and south of Bunbury (*C. virescens* and C. " pulchellus"), and they would require separate reports.

CONTENTS

1 BACKGROUND

Western Australia has a range of native and naturalised species of *Carpobrotus* (pig faces) and the closely related *Sarcozona*. Within the Perth area (Western Australian Herbarium, Florabase) there are four species (*C. virescens*, *C. modestus*, **C. edulis* and *Sarcozona bicarinata*).

Because of their succulent nature and soft flowers *Carpobrotus* species make very poor herbarium specimens and need to be studied alive if at all possible to adequately determine species boundaries. They also readily hybridise when they come into contact and hybrids are recorded between both native and weedy species and between *Sarcozona* and *Carpobrotus*.

Of the species mentioned above only the weedy *Carpobrotus edulis* and the native *C. virescens* are found along the beaches from Wanneroo to Rockingham, the others all occur further inland. Currently most keys are designed to work on herbarium material or on the colour of flowers (Wheeler at al., 2002) which does not identify the species when sterile or the frequent hybrids found or that many native *Carpobrotus* have two sexes.
Because most species are propagated from cuttings and their propensity to hybridise this note has been prepared to assist coastal care groups, collectors and propagators in the Perth area to obtain the correct material of the native species, to detect the weed when either a seedling or when plants are not flowering and to detect hybrids between the weed and the native.

Photo One: Author and members of SNEC at North Beach examining *Carpobrotus virescens*

2 METHODS AND LIMITATIONS

I visited beaches in the North Beach area with members of SNEC on November 6 2014 to view native and planted materials of Carpobrotus species. The area contained both native and naturalised species of *Carpobrotus* (*C. edulis* and *C. virescens*) and several apparent hybrids.

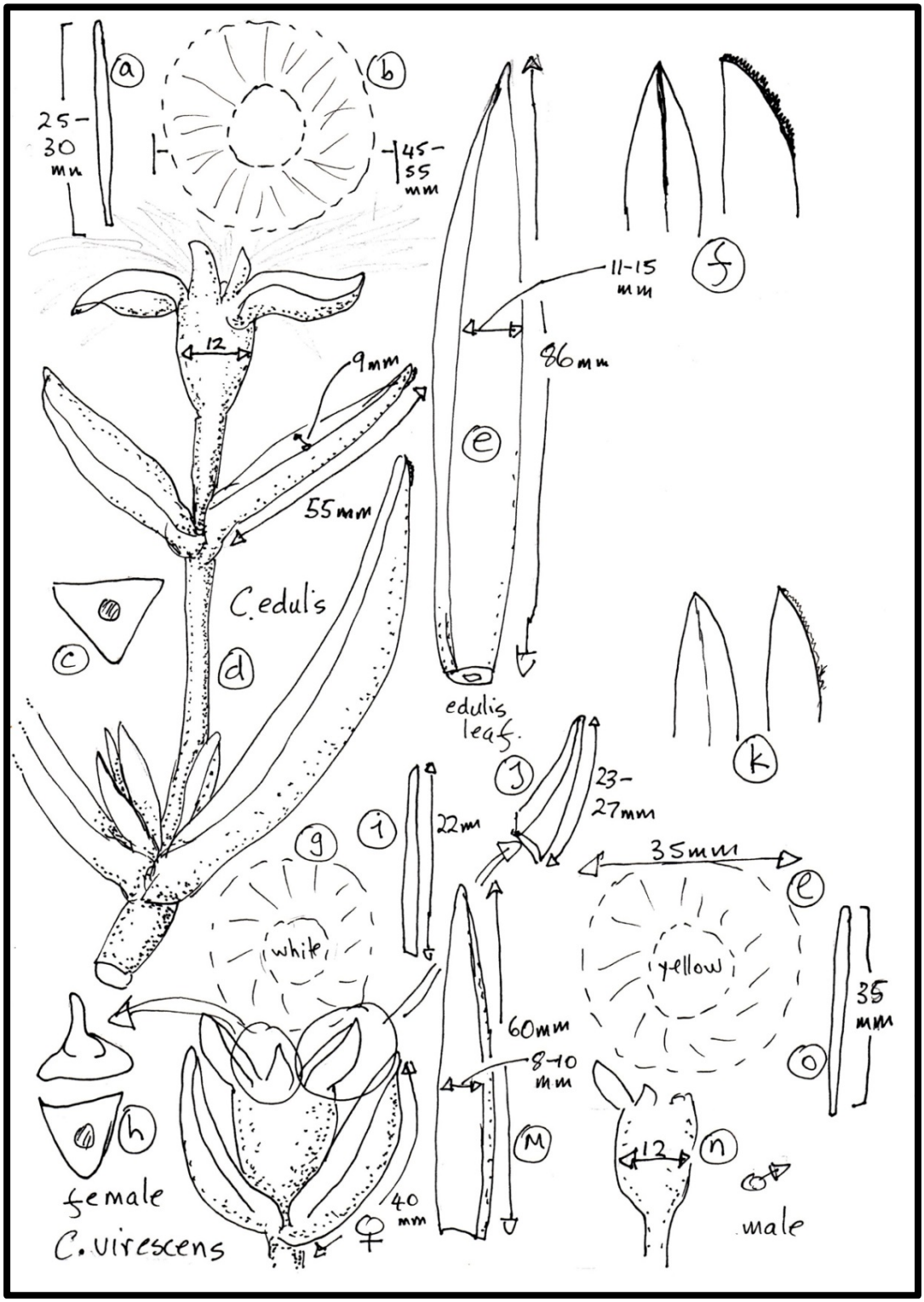

Figure 1- *Carpobrotus* species of the Perth Beaches
a-f: *Carpobrotus edulis*: a -"petals"-staminodia, b- Flower from above, c- cross section of leaf, d- portion of stem below flower, e- mature leaf, f- apex of leaf
g-o: *Carpobrotus virescens*: g- flower of female plant from above, h- cross section of leaf, i-"petal", j- sepal, k- leaf apex, l- male flower, m- leaf, n- ovary of male flower, o- 'petal' of male flower.

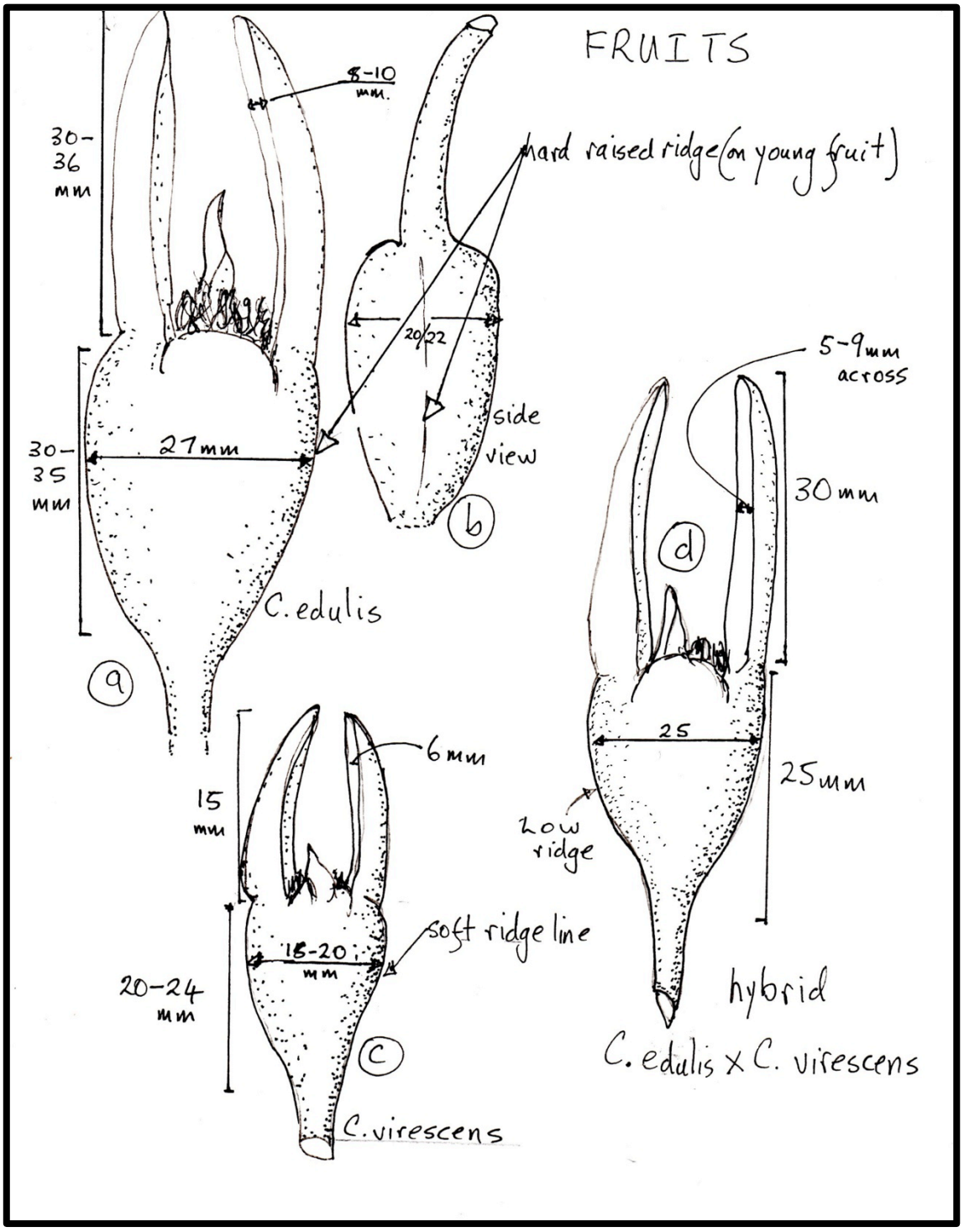

Figure 2- fruits of *Carpobrotus* of Perth Beaches: a-b: *Carpobrotus edulis*: a-front view, b- side view
c- *Carpobrotus virescens*: c-front view, d: hybrid (*Carpobrotus edulis* x *virescens*), front view

3 THE SPECIES

Three taxa are described below: the native *Carpobrotus virescens*, the weed *Carpobrotus edulis* and hybrids between Carpobrotus virescens X *edulis.* Key characters distinguishing species are shown in **bold** type.

3.1 Carpobrotus virescens

This is a low spreading scrambling to prostrate shrub to 2 metres **across with white stems and an increasingly open nature, stems are often flushed red before they turn white**.
Mature leaves green and are **roughly triangular in cross section, usually slightly concave on the upper surface** (Figure 1, h), **normally less than 10 mm across, with minute white teeth along the bottom ridge below the apex** (Figure 1, k).
Plants are normally either male of female (dioecious). Female plants have small flowers that are pale pink, with "petals" that are 20-25 mm long (figure 1, g) **and a white centre with a prominent stigma in the centre** (Photo 2 below). **Male plants have larger flowers that are bright pink, with "petals" that are 32-36 mm long** (Figure 1, o), **yellow in centre (because of the pollen filled anthers, Photo 2) and the stigma never enlarges** (Photo 2, below).
Normally only female plants will form fruits and they have a larger ovary, but there are occasional male plants where the flowers are hermaphrodite with a functioning stigma (perhaps mainly late in the flowering season).
Fruits are purple red and soft succulent when mature with many small brown seeds embedded in a sticky mucilage, they lack a hard ridge on the side of the fruit and **the retained sepals are 13-16 mm long** (Figure 2, c).
NOTE: Non flowering plants will have white stems with leaves that are less than 10 mm across and with a white denticulate margin near the apex.

Photo2: Flowers of female (left) and male flowers (right) of *Carpobrotus virescens*

Carpobrotus

3.2 Carpobrotus edulis

This is a low spreading scrambling to prostrate shrub to 2 metres **across with pale yellow stems and a dense habit (which overtops and smothers other plants).**
Mature leaves blue-green and are **depressed triangular in cross section, usually slightly flat on the upper surface, normally more than 13 mm across with rough brown teeth along the bottom ridge below the apex**(Figure1, c, e and f).
Plants are never dioecious, always have hermaphrodite yellow flowers that age pale pink. "Petals' are 25-30 mm long and flowers are large, 45-55 mm wide
Fruits are yellow, when still green have a prominent ridge along the side, (Figure 2, a & b, Photo 5) soft succulent when mature with many small brown seeds embedded in a sticky mucilage. The fruits have the **sepals attached which are 30-36 mm long and 27 mm wide** (see Figure 2 a & b).

NOTE: Non flowering plants will have pale yellow stems with dull green leaves that are usually 13-15 mm wide but always more than 10 mm across, with a brown line of rough teeth below the apex. Plants are much denser than *C. virescens*.

3.3 Carpobrotus edulis x modestus

Hybrids have hermaphrodite flowers that are pale pink, larger than *C. virescens*, (Figure 2, d) they are fertile and fruits are also intermediate in size (Figure 3, d, Photo 4), with sepals 30 mm or more long (Figure 3, d).

NOTE: Non flowering plants will have pale yellow stems with leaves that are more than 10 mm across, with a brown line of rough teeth below the apex

Photo 3: Flower of presumed hybrid between *Carpobrotus edulis* and *C. virescens* (Photo Georgina Lambert)

Photo4: Fruits of (left to right): *C edulis*, C. hybrid and *C. virescens*.

Photo 5: Side view of *Carpobrotus edulis* fruit showing ridge.

ACKNOWLEDGEMENTS
Thanks to Georgina Lambert for the Photograph and to members of SNEC (especially Rae and Walter Kolb) for their interest in conserving our native flora and their careful observations on plants in the field.

4 COLLECTING CULTIVATION MATERIAL

Most natural populations of *Carpobrotus virescens* have more male plants than female plants, often up to 2:1(e.g. At Seabird 28 males, 15 females and 6 non flowering plants were recorded) proportions. So if one is collecting cuttings it is very desirable to collect when plants are in flower or from a range of plants widely spaced to ensure both sexes are collected.

The same applies if collections are made where both the native and weed occurs to avoid mistakenly collecting hybrids between the two, checking the leaf width and colouration of the aging stems should ensure that the native is collected.

Fruits (deep red-purple, not yellow or light pink) should ideally be collected from plants that are not near any *Carpobrotus edul*is to minimise the risk of hybrids. Checking leaf width of seedlings and cuttings (leaves wider than 10 mm) after six months will tell if there are any that are weeds or hybrids.

5. BIBLIOGRAPHY

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