GOVERNMENT OF
WESTERN AUSTRALIA

Native vegetation of estuaries and saline waterways in south Western Australia

WATER AND RIVERS
COMMISSION

Department of Conservation
and Land Management

ESTUARINE & SALINE

1997

USING THIS BOOKLET

The Water and Rivers Commission has published two companion booklets, one entitled *Native vegetation of freshwater rivers and creeks in south Western Australia* and this present one, *Native vegetation of estuaries and saline waterways in south Western Australia* to encourage protection and restoration of the streamline vegetation which is vital to
maintaining the ecology and water quality of our creeks, rivers and estuaries. It is hoped that these booklets will be useful to community rivercare and landcare groups and other people interested in local flora who wish to identify common plants found along the various types of waterways. If you are interested in joining volunteer rivercare groups, you can contact the appropriate local council or the Water and Rivers Commission.

This booklet deals with the species commonly encountered near saline waterways and wetlands. Because the flora of Western Australia is rich and varied some of the species described here may be confused with plants of other habitats so ensure that your plant has come from a saline environment. The terminology has been simplified as far as possible and a glossary of terms is provided at the back. Inside the back cover there is a transect showing where the various plants may be found and a page index for each plant.
For further information about the vegetation of saline waterways and other habitats a reference list is provided.

ACKNOWLEDGMENTS

This work was prepared for the Water and Rivers Commission by Lisa Chalmers (Policy and Planning) and Judy Wheeler (Conservation and Land Management).

Special thanks to Margaret Wilson for her excellent illustrations which will make for easy identification. Special thanks to Nicole Siemon (Swan River Trust) who instigated the project and provided much input. Thanks to Luke Pen (Water and Rivers Commission) who provided comment and the initial transect drawings. Gratitude is expressed to Karen Majer and Jeff Kite (Water and Rivers Commission) for their comments. Also thanks to Neville Marchant and staff at the Western Australian Herbarium who provided valuable assistance. Thanks to Kathy Meney (Regeneration Technology Pty Ltd) and Pat Hatfield (Leschenault Inlet Management Authority) for some of the propagation information. Thanks to Paul Wilson for help collecting fresh plant specimens for drawing.

ISBN 0-7309-7245-1

Printed on recycled paper

VALUES OF FRINGING VEGETATION

Fringing vegetation plays an important role in the maintenance of a biologically balanced and healthy waterway. It provides a wide range of functions that are essential for supporting plant and animal life and for maintaining the quality of the environment. These functions include: flood control; shoreline stabilisation; sediment, nutrient and pollutant filtering and, most importantly, the provision of food, shelter and breeding habitats for a wide range of organisms.

ESTUARIES OF THE SOUTH WEST

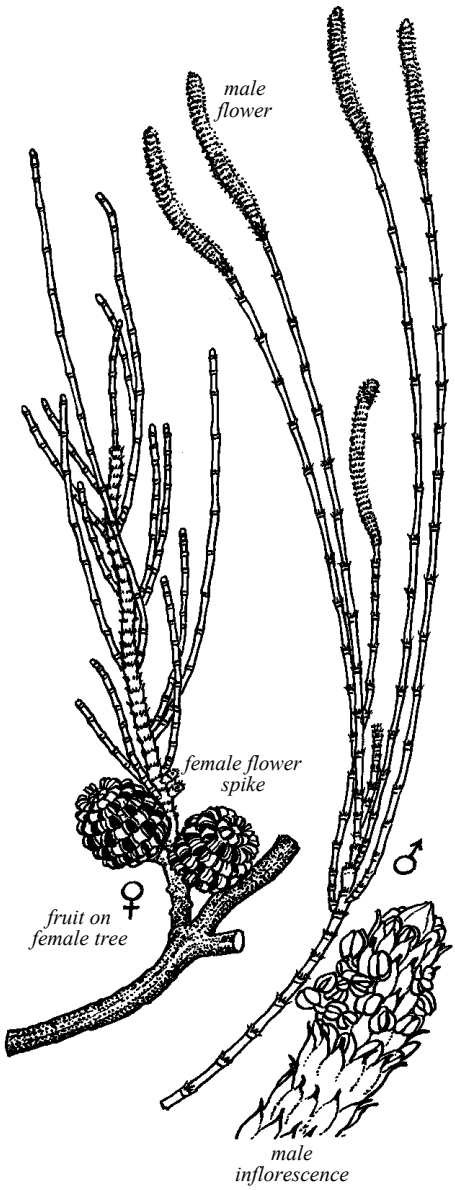
There are thirty three estuaries in the south-west corner of WA from Perth to Esperance. They include varied habitats including sedgelands, saltmarshes, samphire flats, fringing forest and sandy beaches.

The plants which fringe the estuaries are highly adapted to a dynamic environment. The estuarine systems undergo daily changes due to tidal influences, and seasonal changes due to rainfall and river flow regimes. Many of the plants which occupy the estuaries and saline environments can tolerate seasonal waterlogging or inundation. Change in salinity is one of the major influences on estuarine vegetation. The plants must tolerate increasingly saline conditions over summer and autumn. Seasonal rains in winter and spring provide the plant communities with fresh water. They also may receive water from groundwater seepage from the landward side. This freshwater flush is important for many salt-tolerant species as it enables the seeds to germinate.

Estuaries are very productive environments as they receive nutrients and sediments from surrounding catchments. The diversity of habitats caused by variations in inundation, waterlogging, nutrient levels and salinity result in a large number of species and a high biological productivity. A number of native plants are common to estuaries and other salty waterways. In this booklet these have been grouped into trees, shrubs, sedges and rushes, samphires, herbs and grasses.

BRACKISH AND SALINE WATERWAYS OF THE SOUTH WEST

Many of the rivers and creeks in the low rainfall inland areas and coastal areas east of Albany are brackish to saline. These streams support a range of salt-tolerant fringing plant species, many of which are also found on estuaries.



Casuarina obesa
Swamp sheoak
(Casuarinaceae)

LEAVES
There are distinctive, slender, greyish green needles that function as leaves. The real leaves are teeth-like, 12-15 in a whorl at each joint of the needles. The whorls of leaves are between 5-15 mm apart.

FLOWERS
The wind-pollinated flowers are very small. There are numerous tiny orange male flowers in catkin-like clusters at the tips of needles. The female flower spikes appear as globular protrusions from the main stem, the tiny flowers only seen as reddish fringing filaments.

FRUITS
The pale brown fruiting cones are almost globular, 10-20 mm long and 10-30 mm wide. The cones have thin valves which separate the individual seeds.
The seeds are 5-7 mm long with a straw to grey-coloured body and an opaque to translucent wing.

GROWTH FORM AND HABITAT
Swamp sheoak grows to 10 m high with a spread of 4 m. It has gracefully flowing branches. There are separate male and female trees. Swamp sheoak occurs along the rivers, estuaries and clay flats on the coastal plain of WA. It is also widely distributed across southern Australia.

FLOWERING TIME
Flowers throughout the year.

PROPAGATION
Swamp sheoak can be grown from seed planted in autumn and spring. It can also be direct seeded. Collect the cones which are furthest back on the branch to ensure that they are mature. If the seed is red-orange in colour then it is immature. The seed can be collected from mid to late summer.

Eucalyptus occidentalis
Flat-topped yate
(Myrtaceae)

LEAVES
The glossy, dark green leaves are alternate and spreading. They are long and narrow, 60-160 mm long and 10-33 mm wide, and have a conspicuous midrib.

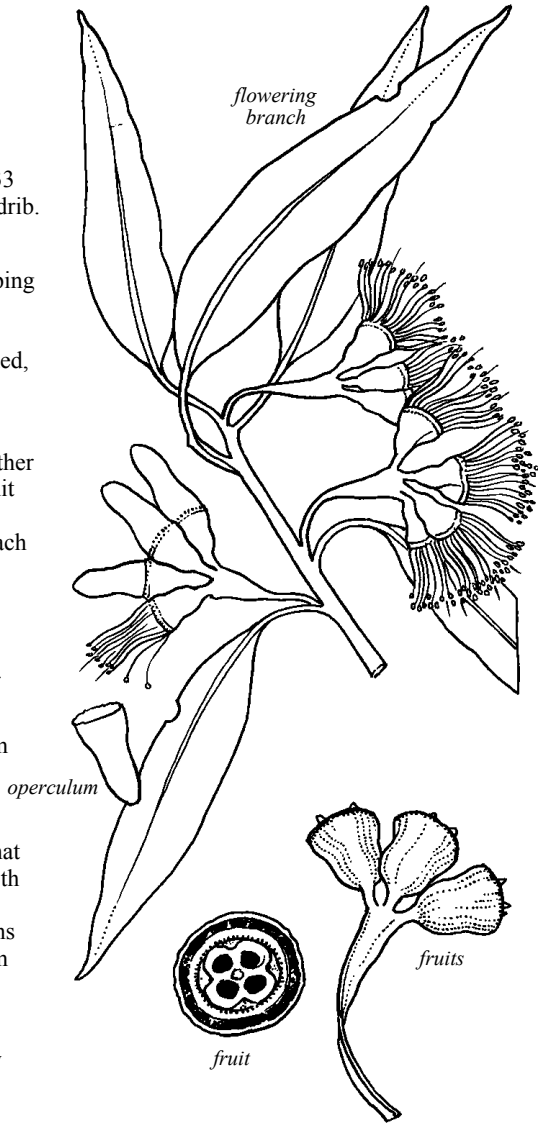
FLOWERS
The inflorescence is made up of drooping clusters of 3 to 7 flowers. The slender buds are 16-33 mm long, with narrow horn-shaped bud caps which, when shed, reveal the white to creamy flowers.

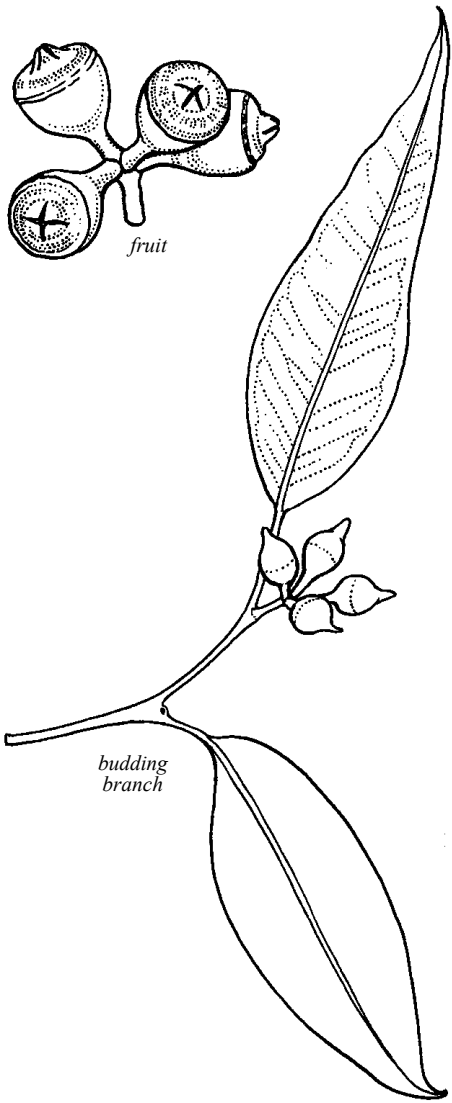
FRUITS
The drooping fruits are clustered together on a flattened common stalk. Each fruit is bell-shaped, smooth, 8-15 mm long and 6-11 mm wide. The rim around each fruit is narrow and there are 4 slender projecting valves.

FLOWERING TIME
Flowers between summer and autumn.

GROWTH FORM AND HABITAT
Flat-topped yate grows to around 20 m tall with a spread of 5 m and has a distinctive branching which gives the crown a broad and flat appearance. The lower bark is rough grey, somewhat fibrous and flaky, higher up it is smooth white or pink to yellowish grey. It is usually associated with wet depressions or clay flats. Distribution extends from Wagin to eastward beyond Esperance.

PROPAGATION
Flat-topped yate can be propagated by seed and is suitable for direct seeding.





Eucalyptus rudis
Flooded gum
(Myrtaceae)

LEAVES
The attractive mature leaves are dull, grey-green or bluish green, alternately arranged and up to 140 mm long and 30 mm wide.

FLOWERS
The inflorescence is an erect cluster of 4 to 10 flowers. The small buds are 8-12 mm long with conical caps which, when shed, reveal white to cream flowers.

FRUITS
The small fruits are brown, hemispherical to broadly bell-shaped, 4-6 mm long and 6-15 mm wide. Each fruit has a very broad rim with 4 to 6 broad projecting valves.

FLOWERING TIME
Flowers autumn to spring.

GROWTH FORM AND HABITAT
Flooded gum is an attractive tree which grows up to 25 m high, with a spread of 4 m and a somewhat rounded crown.
The trunk has persistent, rough and flaky dark grey bark while the upper branches have a smooth cream and pale grey bark.
Flooded gum is a common species fringing winter-wet depressions, lakes and watercourses throughout the Swan Coastal Plain. It is able to tolerate prolonged periods of flooding and is usually found in waterlogged areas.
Distribution extends from north of Geraldton to the south coast.

PROPAGATION
Flooded gum can be grown from seed planted in spring. It is suitable for direct seeding. Collect the mature woody fruits for seed.

Melaleuca cuticularis
Saltwater paperbark
(Myrtaceae)

LEAVES
The leaves are a dull greyish green and are arranged in two opposite pairs forming four regular lines of leaves down the stem. The leaves, although thick, are somewhat flattened and elliptic in shape. They are 5-12 mm long and 1.5-3 mm wide.

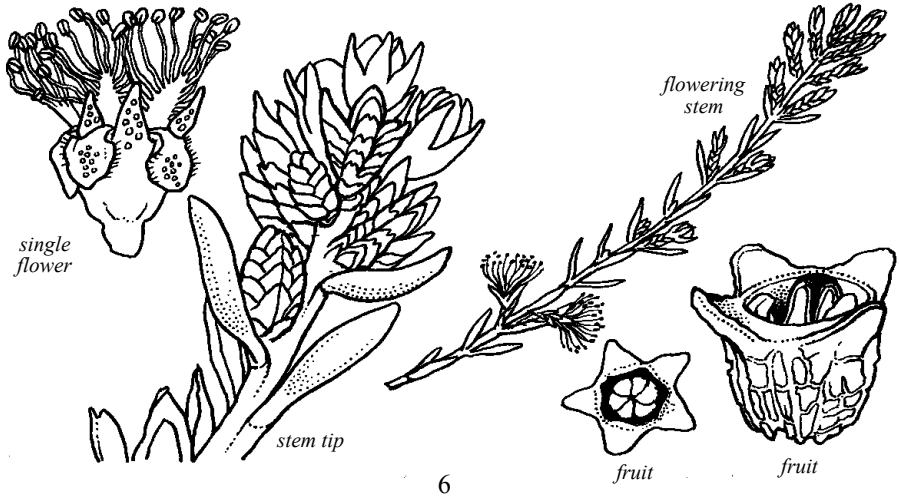
FLOWERS
The white to cream flowers are single or in small clusters near the end of the stem, each with numerous prominent stamens.

FRUITS
The woody fruits are solitary or only a few together. They are 6-11 mm wide and have 5 protrusions around the rim making a star-like shape.

FLOWERING TIME
Flowers from spring to early summer.

GROWTH FORM AND HABITAT
Saltwater paperbark is a small gnarled tree or large shrub up to 7 m high with very white papery bark. It grows in salty wetlands as it is tolerant of both waterlogging and salt in the air and water. Saltwater paperbark is distributed from Perth along the west and south coast to Israelite Bay.

PROPAGATION
Saltwater paperbark can be propagated by seeds planted in autumn and spring. Check that the capsules are woody and plump, indicating maturity. It can be direct seeded.



Melaleuca rhaphiophylla
Swamp paperbark
(Myrtaceae)

LEAVES
The green to greyish green and spreading leaves are arranged alternately along the stem. They are needle-like and circular in cross section. The narrow leaves are 10-40 mm long and only 0.5-1 mm wide with a pointed tip.

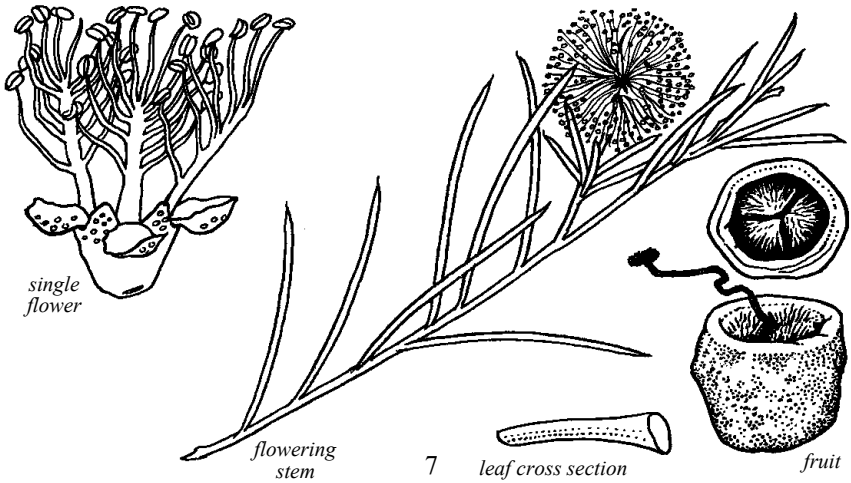
FLOWERS
The flowers occur in dense, cream elongated clusters (spikes), usually towards the end of the stem. The flowers have prominent stamens which give the spike a bottlebrush-like appearance. Often new leaves are already forming at the end of the stem when the flowers open.

FRUITS
The woody fruits occur in clusters along the stem. Each is almost spherical and 5-6 mm in diameter.

FLOWERING TIME
Flowers from spring to summer.

GROWTH FORM AND HABITAT
Swamp paperbark is a small to medium tree to 10 m high with greyish white papery bark. It grows near watercourses and wetlands at the drier end of the littoral zone.
Swamp paperbark is able to tolerate periodic inundation for several months of the year, but prefers waterlogged sites. It can be found near both fresh and saline water, but is less adapted to saline conditions than saltwater paperbark. Distributed along the coast from Kalbarri to Fitzgerald River National Park and also inland to York.

PROPAGATION
Swamp paperbark can be grown from cuttings or by seed planted in autumn and spring. It can be direct seeded. It has been suggested that the seed can be thrown onto the water and that this will place the seeds at the right height along the banks for successful germination.



Melaleuca thymoides
a Myrtle
(Myrtaceae)

LEAVES
The leaves are alternately arranged along the stem. They are flat and elliptic in shape tapering to a point and have three prominent longitudinal veins.
The leaves are up to 12 mm long and 1.5-2.5 mm wide.

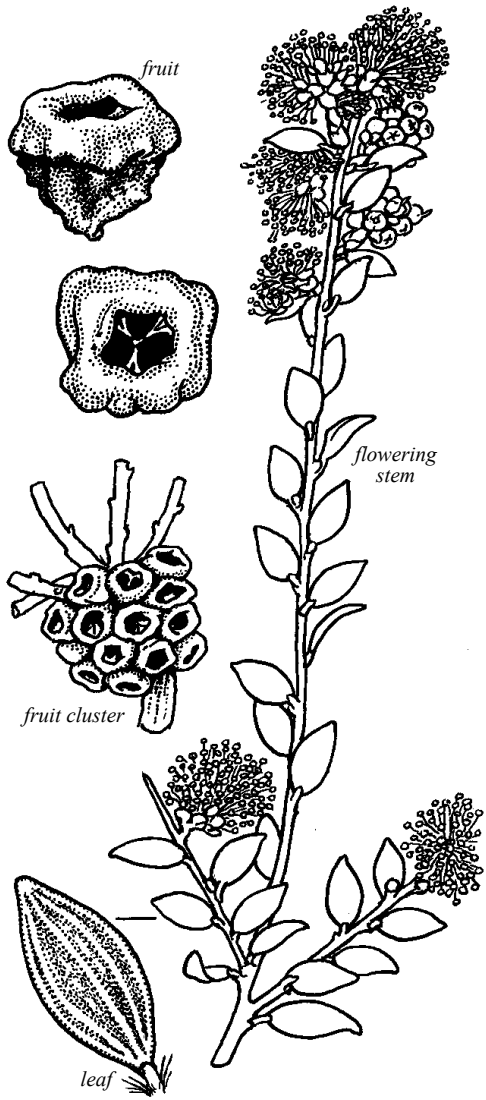
FLOWERS
The flowers are cream to pale yellow and occur in dense spherical heads towards the end of the stem.

FRUITS
The small fruits are woody, 2-3 mm across and grouped in spherical clusters.

FLOWERING TIME
Flowers in spring and summer.

GROWTH FORM AND HABITAT
This species is a shrub to tree which grows up to 2 m high and has short spiny branchlets. It prefers light well-drained soils and occurs in sands in winter-wet depressions. Distributed from Perth to the south coast and eastwards to Israelite Bay.

PROPAGATION
This species can be propagated by seed planted in autumn or spring or by semi-hardwood cuttings. It is suitable for direct seeding.



Melaleuca viminea
Mohan
(Myrtaceae)

LEAVES
The dark green leaves are arranged alternately along the stem. They are thick but flattened, linear to narrowly elliptic in shape, up to 23 mm long and 1-2 mm wide and often somewhat curved.

FLOWERS
The white to pale yellow flowers are perfumed and arranged in elongated clusters (spikes) towards the end of the stem. The flowers have numerous stamens which give the spikes a bottlebrush-like appearance.

FRUITS
The grey woody fruits are clustered near the end of the stem. They are small, cup-shaped and 3-4 mm across.

FLOWERING TIME
Flowers between late winter and mid spring.

GROWTH FORM AND HABITAT
Mohan is an attractive neat rounded shrub or tree up to 8 m tall and with a spread of 3 m. It branches evenly and has an unbroken canopy. Mohan has dark, rough and fibrous bark and is found fringing rivers and estuaries or in winter-wet swamps. It is distributed between Kalbarri and the south coast extending east to Mt Ragged, and may be found in several places beside the Swan and Canning estuaries.

PROPAGATION
Mohan can be propagated by seed planted in autumn or spring or by semi-hardwood cuttings. It is suitable for direct seeding and also for the water dispersal of seeds.

Atriplex hypoleuca
a Saltbush
(Chenopodiaceae)

LEAVES
The leaves are mostly more or less opposite. They are flat and elliptic, 10-40 mm long and have a dense scaly sheen on the undersurface.

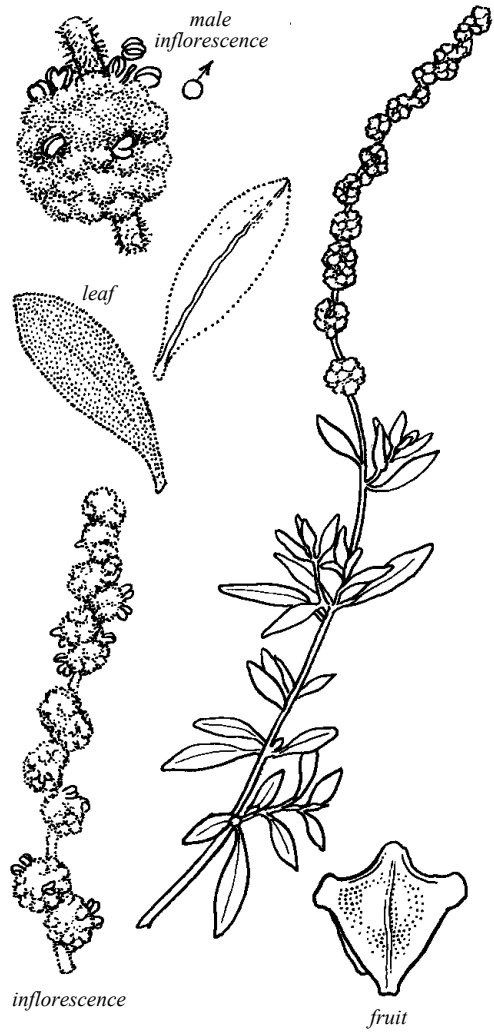
FLOWERS
The male inflorescence is an elongated spike of clusters of flowers and occurs towards the tip of the stem. It is up to 50 mm long. The female inflorescence, which occurs on the same plant as the male inflorescence, has flowers in small clusters.

FRUITS
The tiny fruits are enclosed between 2 more or less triangular-shaped bracts which are flat, smooth and 4-6 mm long.

FLOWERING TIME
Flowers mostly summer and autumn.

GROWTH FORM AND HABITAT
This shrub sprawls along the ground and is found in wet saline soils on coastal and estuarine fringes. It is distributed from Perth to Albany.

PROPAGATION
Saltbush can be grown by seed or strikes readily from cuttings. It is difficult to direct seed.



Frankenia pauciflora
Sea heath
(Frankeniaceae)

LEAVES
The greyish leaves are narrow, opposite and up to 13 mm long. The upper surface of the leaf is smooth and often salt-encrusted. The leaf margins are rolled backwards over the lower surface concealing the minute hairs each side of the smooth midrib.

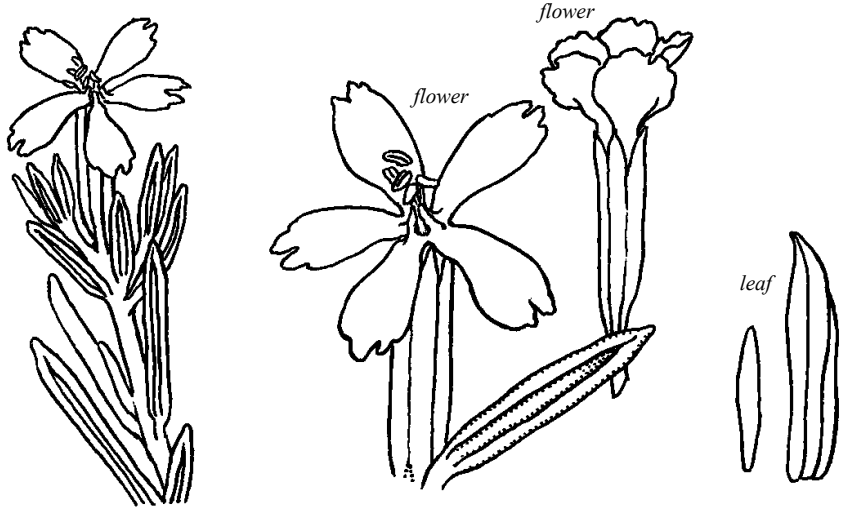
FLOWERS
The pink or white flowers occur in the upper leaf axils towards the end of the stems. Each flower is about 10 mm in diameter and has 5 or 6 spreading petals which have minutely and irregularly torn tips.

FRUITS
The fruit is a cylindrical ribbed capsule.

FLOWERING TIME
Flowers throughout the year.

GROWTH FORM AND HABITAT
Sea heath is a small shrub which grows to a height of 0.5 m. It grows in saline habitats, particularly coastal sands or saline flats and is found from Dampier along the coast to South Australia. It also occurs in Victoria and Northern Territory.

PROPAGATION
Sea heath can be grown from stem cuttings taken at any time of the year.



Myoporum caprarioides
Slender myoporum
(Myoporaceae)

LEAVES
The leaves of slender myoporum are narrow and thin, 17-70 mm long and 3.5-13 mm wide. They are not succulent, are often prominently dotted with oil glands and have minutely serrated margins.

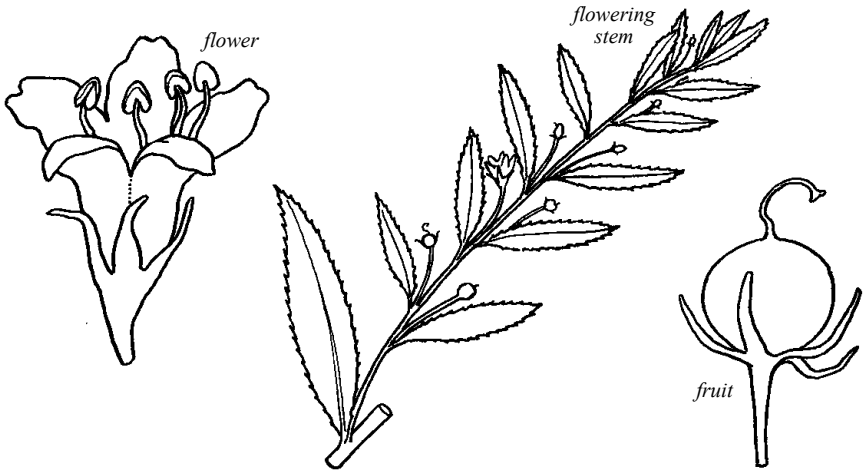
FLOWERS
One or two flowers occur at the junction of the upper leaves and stem. The delicate flowers are white with mauve spots or entirely pink-mauve. They are 3-8 mm in diameter with 5 spreading lobes.

FRUITS
The fruits are brown, almost spherical in shape and 2-3 mm long.

FLOWERING TIME
Flowers all year except for part of winter.

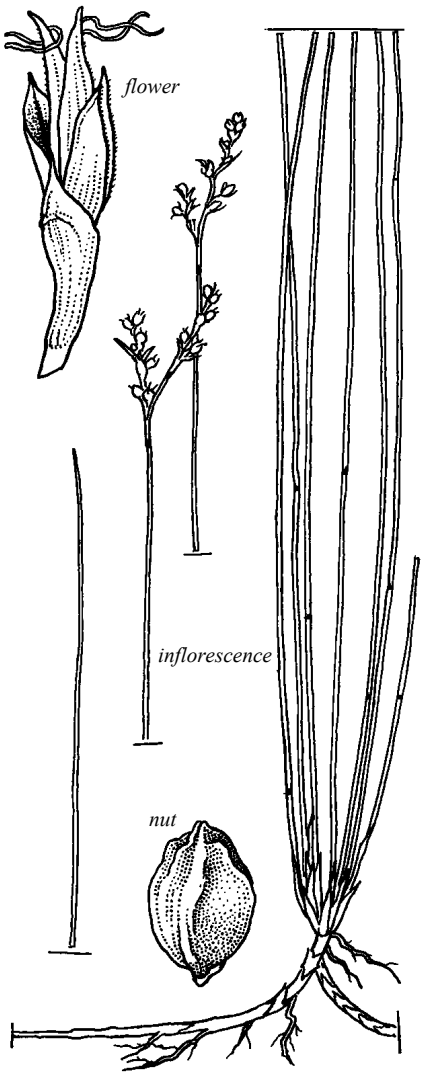
GROWTH FORM AND HABITAT
Slender myoporum is a shrub up to 2 m high. It occurs along the coast mainly in limestone areas dominated by tuart but often in winter-wet depressions and along water courses. It extends along the coast from Dongara to Busselton.

PROPAGATION
Slender myoporum can be grown from seed or cuttings.



Baumea juncea
Bare twigrush
(Cyperaceae)

LEAVES
Bare twigrush has smooth, cylindrical, blue-green stems which are 1-3 mm in diameter. The leaves are very small and are reduced to a sheath enclosing the stem with only a flat or folded blade 2-10 mm long.



FLOWERS
The spike-like inflorescence is 10-60 mm long with small brown spikelets 3-5 mm long, each containing one or more small flowers. Each flower has a small bract but lacks floral segments.

FRUITS
The fruits are tiny 3-ribbed nuts, one maturing in each spikelet.

FLOWERING TIME
Flowers spring and summer.

GROWTH FORM AND HABITAT
A widespread sedge 0.5-1.2 m tall with creeping underground stems, often forming extensive colonies along watercourses, estuaries and swamps throughout the south-west of the State. Bare twigrush may be found in seasonally waterlogged to partially inundated areas which have fresh to brackish or seasonally saline water. It prefers a fairly constant water level but will tolerate seasonal fluctuations up to half a metre. Bare twigrush is distributed along the coast from Dongara to the Recherche Archipelago, but also occurs in South Australia, Queensland, New South Wales, Tasmania, New Zealand and New Caledonia.

PROPAGATION
Bare twigrush can be propagated from seed using in-vitro culture of seed embryos. It is readily established through rhizome transplantation. Sections of rhizome approximately 100 mm long with a good root mass and healthy leaves can be planted half a metre apart. Plant rhizomes in winter and spring at a depth of 100-250 mm in sandy sediments. Do not trim leaves.

Bolboschoenus caldwellii
Marsh club-rush
(Cyperaceae)

LEAVES
Marsh club-rush has stems which arise singly from the rhizome and are bright green. They are triangular in cross section, with grass-like alternate leaves along the stem. The leaves are up to 850 mm long and 3-12 mm wide, with a prominent midrib and distinct longitudinal veins.

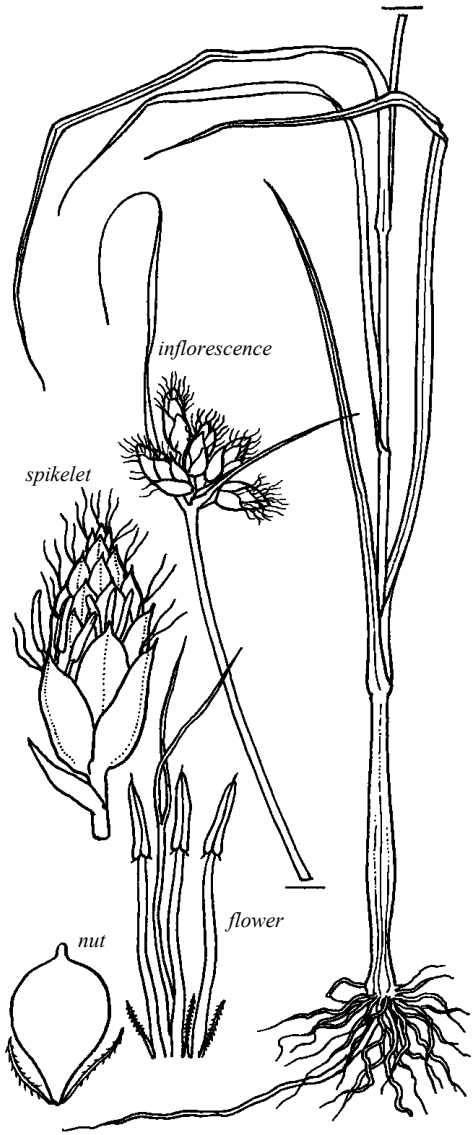
FLOWERS
The inflorescence is a cluster of spikelets at the tip of the stem along with several leaf-like bracts. The golden brown spikelets are 12-20 mm long, each containing several small flowers. Each flower has a bract and the floral segments are reduced to 3-6 tiny bristles.

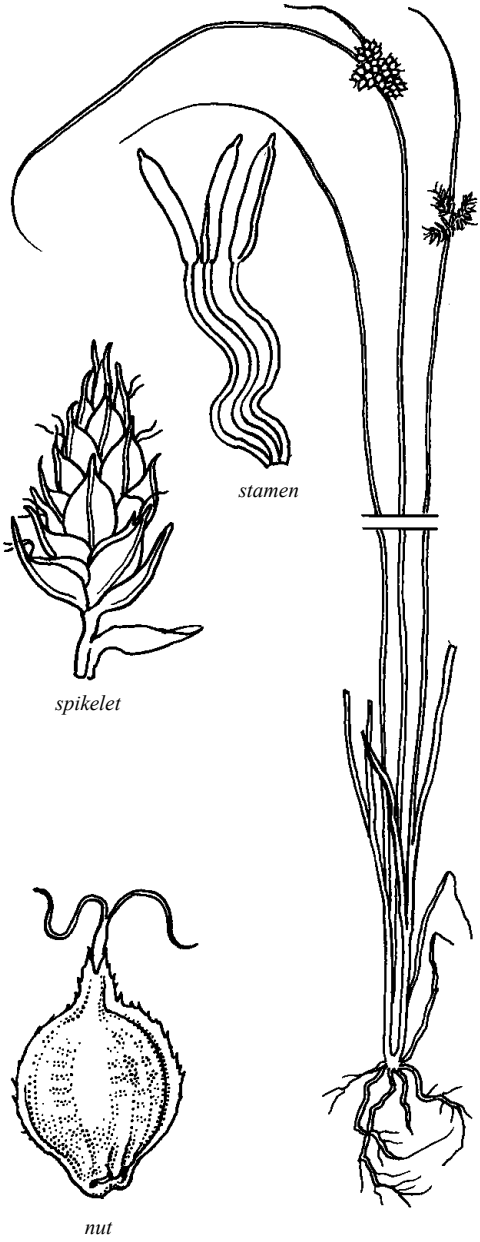
FRUITS
The fruits are flattened to almost triangular in shape, brown when ripe, and around 3 mm long. There may be up to 250 seeds per inflorescence.

FLOWERING TIME
Flowers in spring.

GROWTH FORM AND HABITAT
Marsh club-rush is a grass-like tufted plant which forms large colonies and reaches a height of 1.2 m. It grows in seasonally damp to seasonally inundated sites. Marsh club-rush can tolerate a wide range of seasonal water fluctuations as it dies back to underground parts in summer and autumn and resprouts after winter flooding. It is distributed from north of Perth to the south coast and extends east to Fitzgerald River National Park.

PROPAGATION
The seed germinates readily if germinated immediately after collection. In-vitro culture can also produce seedlings, however direct seeding is more successful. Rhizome transplantation is not recommended as it is difficult and the results are variable.





Carex inversa
Knob sedge
(Cyperaceae)

LEAVES
The slender, somewhat flattened stems are triangular in cross section and erect. The grass-like leaves are flat and smooth and 1-4 mm wide.

FLOWERS
The inflorescence is a cluster of one to several brownish spikelets. The spikelets have a few male flowers at the base and more numerous female flowers above. Each small flower has a bract but lacks floral segments.

FRUITS
The fruit is a small nut about 2 mm long.

FLOWERING TIME
Flowers in spring.

GROWTH FORM AND HABITAT
Knob sedge reaches a height of 1.5 m and dies back in winter. It grows along water courses and lake margins in peat and sand throughout southern Australia. It is found in seasonally wet or waterlogged soils and in fresh to semi-saline conditions.
Knob sedge occurs from Perth south to Fitzgerald River National Park and inland to Northam.

PROPAGATION
Knob sedge can be propagated by seed or rhizome division.

Gahnia trifida
Coast saw-sedge
(Cyperaceae)

LEAVES
The stems are circular in cross-section and 2-4 mm wide. The leaves, which are 150-1200 mm long, appear circular in cross-section having tightly inrolled margins and taper to a point. They are covered with minute, upward-pointing rigid hairs.

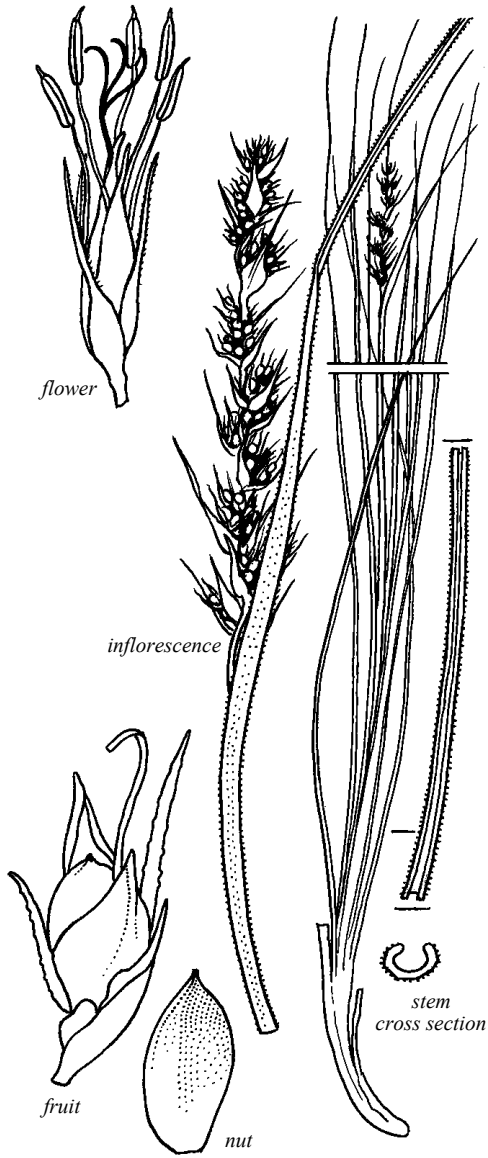
FLOWERS
The inflorescence has a number of branchlets, each branchlet with numerous tight clusters of spikelets. The brown spikelets are 4-5 mm long, each usually with only a single flower. Each flower has a bract but lacks floral segments.

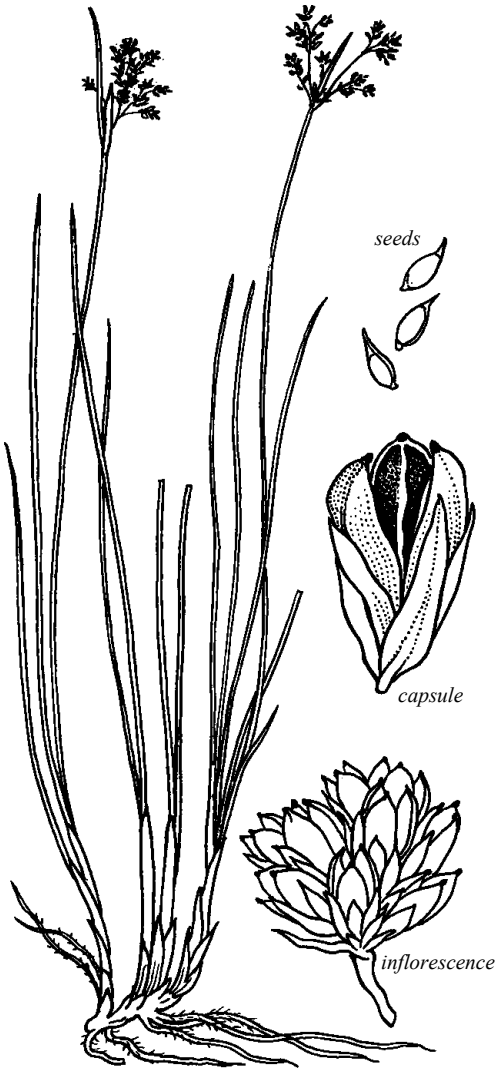
FRUITS
The fruit is a shining nut, only one per female spikelet.

FLOWERING TIME
Flowers mainly in winter and spring.

GROWTH FORM AND HABITAT
Coast saw-sedge is an attractive tall sedge to 1.5 m high, forming a dense tussock often 1 m in diameter. It is found in seasonally wet, well drained but often saline sandy soils and in sand along estuaries, watercourses and in winter-wet depressions in coastal to near-coastal areas. It is distributed from Kalbarri to Cape Arid National Park.

PROPAGATION
Coast saw-sedge is suitable for transplantation and propagation from seed.





Juncus kraussii
Sea rush
(Juncaceae)

LEAVES
The stems are circular in cross section and 2-4 mm broad, and have a continuous pith. The leaves are few and basal, and are similar to the stems but with a short sharp apex.

FLOWERS
The inflorescence is 35-125 mm long and has numerous head-like clusters of flowers. Each cluster has 3-15 dark red-brown flowers, each flower with 6 floral segments.

FRUITS
The fruits are dark brown capsules which split to release tiny seeds which are usually winged.

FLOWERING TIME
Flowers late spring to early summer.

GROWTH FORM AND HABITAT
Sea rush is a tussock-forming plant 0.8-1.5 m high with dark green stems. It forms attractive compact clumps usually covering extensive areas. The stems arise singly along the rhizome. One of the most widespread wetland sedges, growing in saline and brackish habitats fringing watercourses and lakes, also on sea shores. It occurs from north of Geraldton to Cape Arid, but has also been recorded from the Pilbara. Found in all Australian States, also New Zealand and South Africa.

PROPAGATION
Sea rush can be propagated by using rhizome transplantation or direct seeding. Transplantation of healthy clumps has been quite successful when the leaves have been cut about 10 cm above the base to reduce moisture loss. wwThe best time to transplant is during its dormant period around May to June before the maximum growth period from July to October.

SEDGES & RUSHES

Lepidosperma gladiatum
Coastal sword-sedge
(Cyperaceae)

LEAVES
The stems are 13-22 mm wide, are convex in the centre but have flattened margins. The dark green leaves are similar to the stems but somewhat flatter. They are up to 1.5 metres long and 25 mm wide.

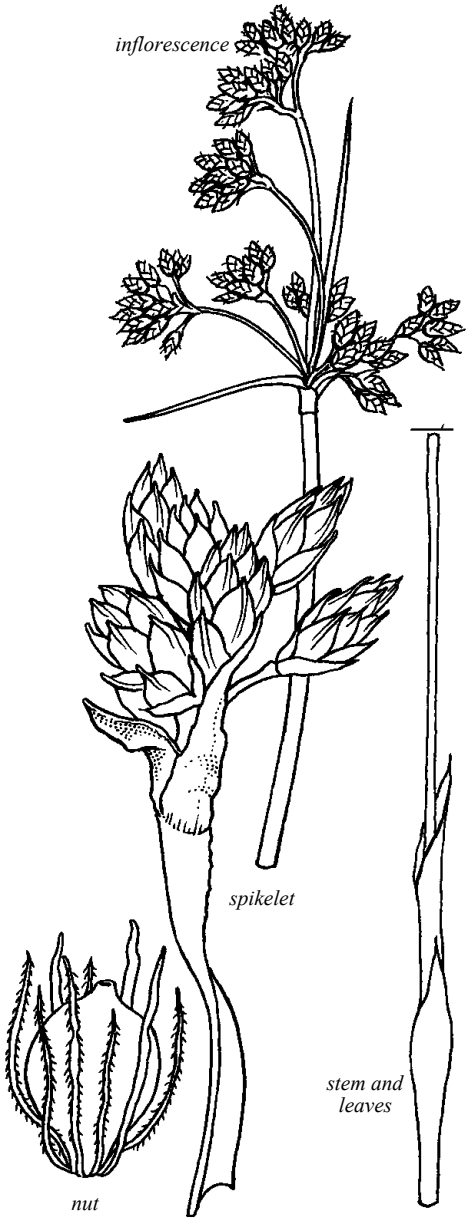
FLOWERS
The inflorescence is a branched spike 40-180 mm long with many spikelets. The spikelets are 7-9 mm long, each with 1 or 2 small flowers. Each flower has a bract and 6 small floral segments.

FRUITS
The fruit is a pale to dark brown nut about 3 mm long. There are only 1 or 2 nuts per spikelet.

FLOWERING TIME
Flowers late spring and early summer.

GROWTH FORM AND HABITAT
Coastal sword-sedge forms broad clumps and reaches up to 1.5 m in height.
It is perennial and is found in seasonally moist or wet sands as well as dry dunes. Widespread on coastal dunes and sandy lake margins from Leeman to Cape Arid.

PROPAGATION
Coastal sword-sedge can be transplanted and also grown from seed.



Schoenoplectus validus
Lake club-rush
(Cyperaceae)

LEAVES
The stems are circular in cross section and 3-10 mm broad with longitudinal grooves. The leaves are reduced to a sheath with an oblique tip, the blade being absent.

FLOWERS
The inflorescence is a cluster of numerous spikelets. The brown spikelets are 5-14 mm long and 4-5 mm wide. Each spikelet has many small flowers and each flower has a bract and 5 or 6 bristle-like floral segments.

FRUITS
The fruit is a smooth, brown, slightly compressed nut. The nuts are approximately 2 mm long. There are around 600 nuts per inflorescence.

FLOWERING TIME
Flowers in late spring to summer.

GROWTH FORM AND HABITAT
Lake club-rush is an erect sedge reaching up to 3 m high. It forms clumps and sometimes extensive colonies.
Lake club-rush grows in fresh, brackish or semi-saline water. It is widespread in the south-west in winter-wet depressions and around the margins of lakes and rivers. Occurs on the coastal plain from Yanchep to the Blackwood River. It also occurs in all other Australian States except the Northern Territory, also in other countries bordering the Pacific Ocean.

PROPAGATION
Seed germination does occur in this species, however few seeds germinate. In-vitro culture may be used to produce seedlings. Planting rhizomes, with a minimum length of 4 to 5 aerial stems, should be done in winter and the leaves should be cut to prevent desiccation.

SAMPHIRES

Halosarcia halocnemoides
Shrubby samphire
(Chenopodiaceae)

LEAVES
The leaves, which are apparently absent, are much reduced and fused together forming part of the rim of each of the stem segments. The intricate segmented stems are green to red and are spherical, 2-5 mm long and glossy.

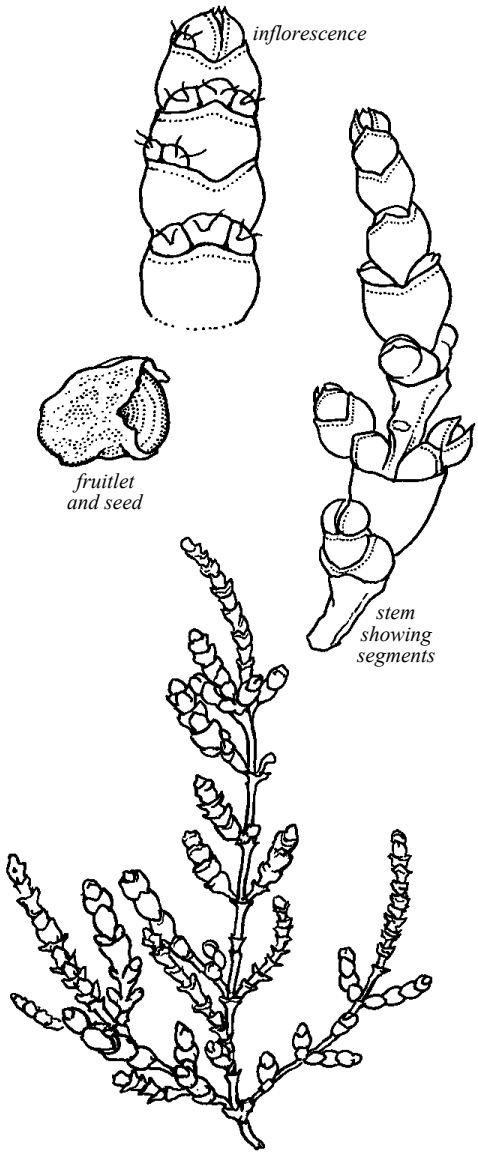
FLOWERS
The flowers develop in a terminal portion, up to 25 mm long, of the stem segments. The tiny flowers are in clusters of 3 and may be found hidden within the terminal succulent stem segments. Often only the single stamen or slender 2-lobed style of each flower is visible beyond the succulent bracts.

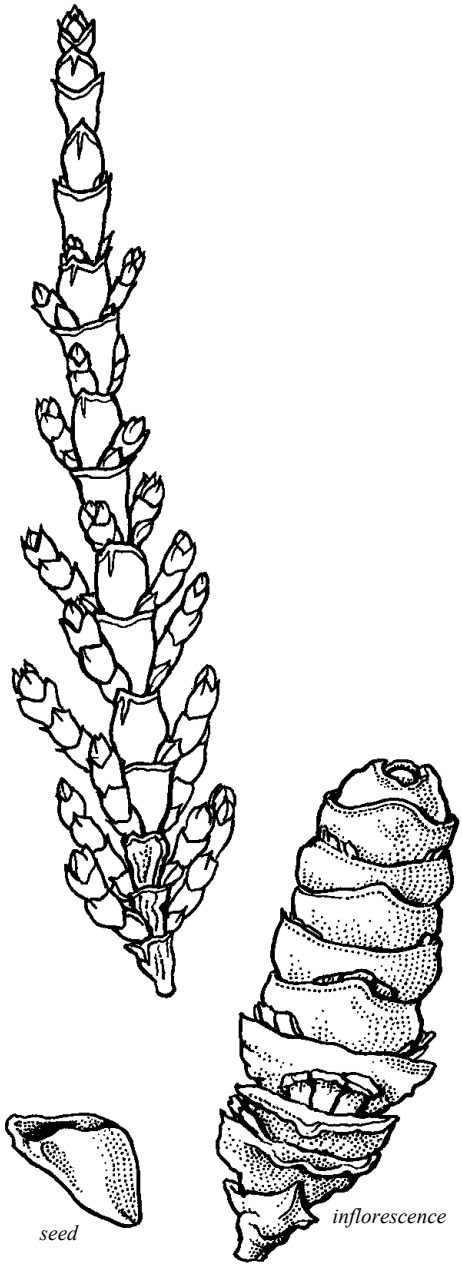
FRUITS
The small succulent fruitlets separate from the plant and the disc-like seeds protrude from the torn edge of the fruitlet. The seeds are flat and circular, about 1 mm in diameter and reddish brown with small rises in concentric rows on the surface.

FLOWERING TIME
Flowers from late spring to early autumn.

GROWTH FORM AND HABITAT
Shrubby samphire is a spreading, much-branched shrub up to 0.3 m high. It occurs on damp saline flats near the coast and along rivers. Widespread in Western Australia. It also occurs in South Australia, Victoria, Queensland and the Northern Territory.

PROPAGATION
Shrubby samphire can be grown from dispersed seed or dry flowering segments. Mature fruiting segments are green in colour and can be harvested in late summer. These can be dried and spread on 'ploughed'soil before the first autumn rains.





Halosarcia indica
a Samphire
(Chenopodiaceae)

LEAVES
The leaves, which are apparently absent, are much reduced but may be seen as a slight lobing of the stem segments. The segmented stems are blue-green in colour, thick and very succulent. The segments are more or less cylindrical but slightly wider at the top and 5-10 mm long.

FLOWERS
The flowers develop in a terminal portion, up to 20 mm long, of the stem segments. The flowers are in clusters of 3 concealed by succulent bracts with only the stamen and 2-lobed style of each flower protruding.

FRUITS
The fruiting area becomes grey and corky with age. The inconspicuous fruits become hard and horny. The seed is pale brown, smooth and glossy.

FLOWERING TIME
Flowers from late spring to autumn.

GROWTH FORM AND HABITAT
This samphire is a dense shrub up to 2 m high. It is widespread in Western Australia and common on saline flats around coastal and inland estuaries and lakes. It also occurs in all mainland Australian States and on tropical coasts bordering the Indian Ocean.

PROPAGATION
This species can be propagated from the green fruiting segments. The fruiting material can be collected in late summer, dried and dispersed before the first rains.

SAMPHIRES

Halosarcia lepidosperma
a Samphire
(Chenopodiaceae)

LEAVES
The leaves are not apparent.
The segmented stems are yellowish green to dull green or slightly blue-green in colour. The segments are more or less cylindrical and 5-10 mm long.

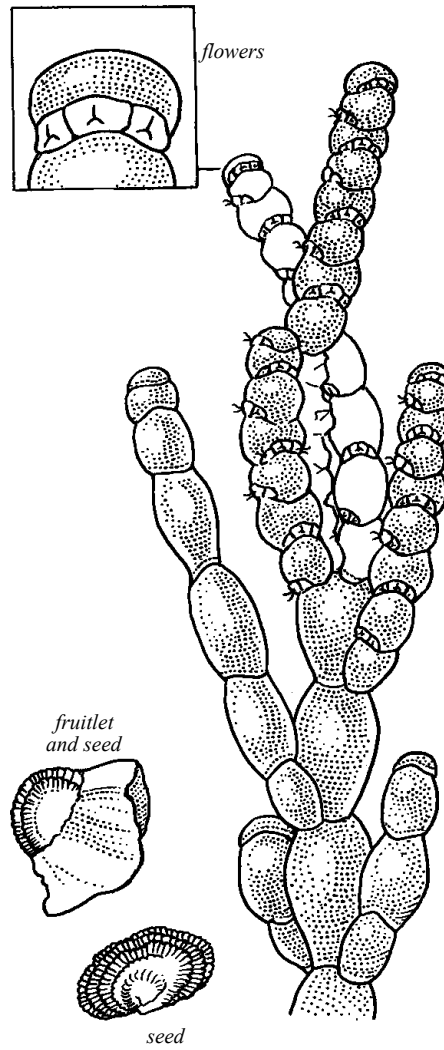
FLOWERS
The flowers develop in a terminal portion, up to 50 mm long, of the stem segments. The clusters of 3 flowers are prominently exposed from the succulent bracts.

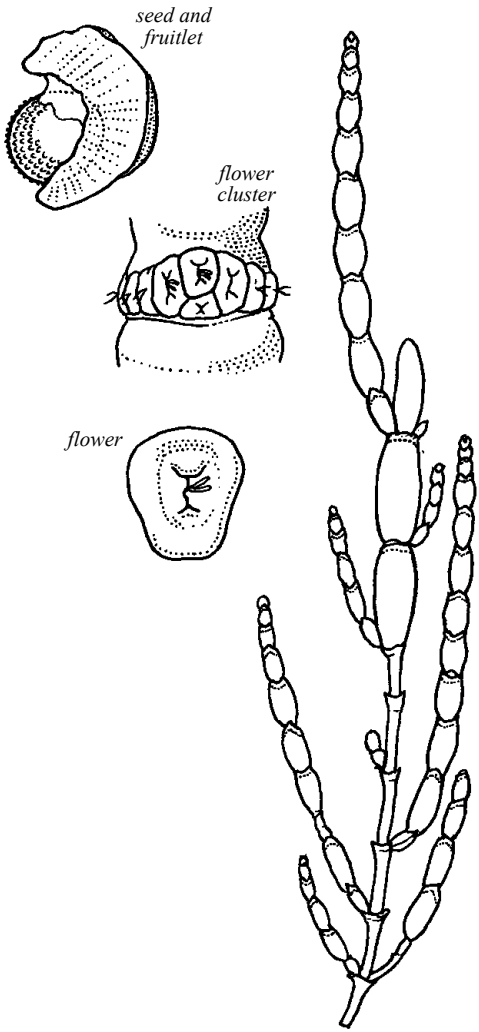
FRUITS
The small succulent fruitlets separate from the plant and the almost spherical seeds protrude from the torn edge of the fruitlet. The seed is white or pale brown when dry and around 1.5 mm in size.

FLOWERING TIME
Flowers in late summer and autumn.

GROWTH FORM AND HABITAT
This shrub is up to 1 m high with erect slender branches. It is found on saline flats bordering swamps and rivers from Coorow to Israelite Bay. It also occurs in South Australia.

PROPAGATION
This samphire can be propagated by spreading mature fruiting material over the site. The seeds mature in late autumn.





Sarcocornia blackiana
a Samphire
(Chenopodiaceae)

LEAVES
The leaves, which are apparently absent, are actually fused together forming part of the 2-lobed rim of each of the stem segments. The segmented stems are succulent. The stem segments are up to 10 mm long.

FLOWERS
The flowers develop in a terminal portion, up to 50 mm long, of the stem segments. There are 5-13 tiny flowers in each cluster, often with the central flowers of the cluster in two rows. Each flower has 2 stamens and a 2-lobed style which protrude from the succulent bracts.

FRUITS
The fertile portion of the segmented stem enlarges to 5-6 mm in diameter in fruit. The tiny seeds are circular and covered with rounded projections.

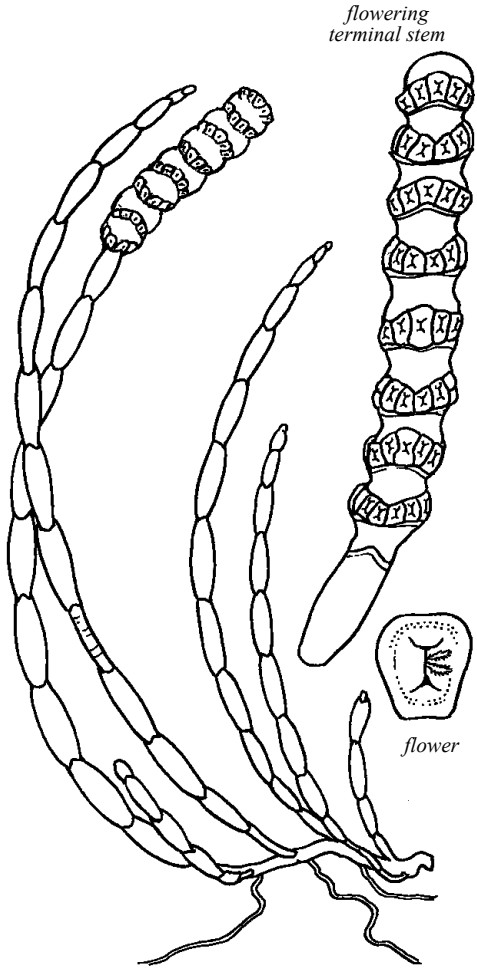
FLOWERING TIME
Flowers spring and summer.

GROWTH FORM AND HABITAT
This samphire is an erect or spreading shrub up to 0.8 m high, frequently rooting at the nodes. It is found on littoral limestone cliffs and saline marshes along the coast. It is distributed from Carnarvon to Caiguna and inland to Cunderdin.
It also occurs in South Australia, Victoria and Tasmania.

PROPAGATION
This samphire can be propagated by scattering the fruiting segments in the spring, at least a couple of weeks before the last rains.

SAMPHIRES

Sarcocornia quinqueflora
Beaded samphire
(Chenopodiaceae)



LEAVES
The leaves, which are apparently absent, are actually fused together forming part of the 2-lobed rim of each of the stem segments. The segmented stems are succulent. The stem segments are 5-15 mm long.

FLOWERS
The flowers develop in a terminal portion, 10-50 mm long, of the stem segments. There are 5-9 tiny flowers in each cluster, in a single row. Each flower has 2 stamens and a 2-lobed style which protrude from the succulent bracts.

FRUITS
The fertile portion of the segmented stem enlarges to 3-5 mm in diameter in fruit. The tiny seeds are circular and covered with tapered projections.

FLOWERING TIME
Flowers from spring to late summer.

GROWTH FORM AND HABITAT
Beaded samphire is an erect or spreading shrub up to 0.5 m high, often rooting at the nodes. It is found on saline flats associated with lakes, estuaries and rivers close to the coast. Sometimes it is found in very shallow water. It is distributed from Carnarvon to Bremer Bay and inland to Merredin. It also occurs in all Australian States except the Northern Territory, and in New Zealand and New Caledonia.

PROPAGATION
Beaded samphire can be propagated by scattering the fruiting segments in spring, at least a couple of weeks before the last rains.

Hemichroa pentandra
Trailing jointweed
(Amaranthaceae)

LEAVES
The leaves are alternately arranged along the stems and are thick and succulent. They are narrowly oblong, 8-12 mm long and 1-2 mm wide.

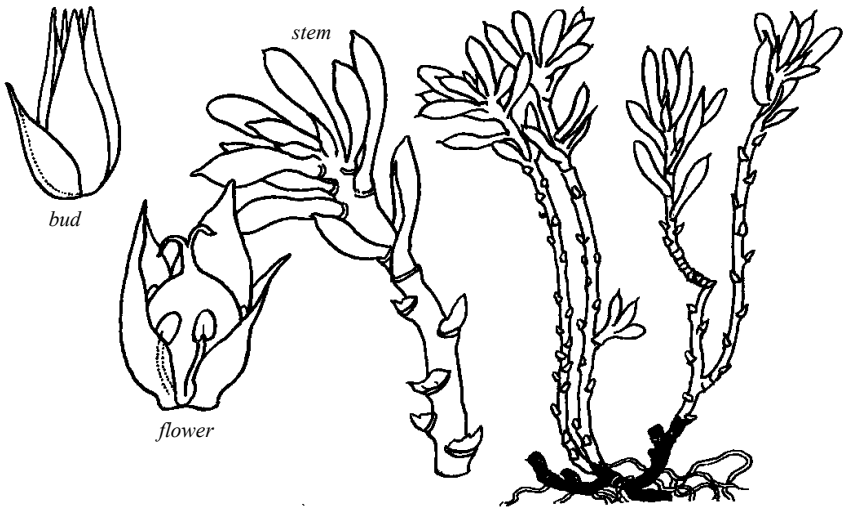
FLOWERS
The flowers are white and occur singly along the stem. Each flower has 5 petal-like segments 4 mm long.

FRUITS
The small fruits each contain a black shiny seed.

FLOWERING TIME
Flowers in late spring.

GROWTH FORM AND HABITAT
Trailing jointweed is a sprawling to prostrate succulent perennial herb. It occurs in saline coastal or salt lake habitats and is found at Rottnest. It also occurs in South Australia, New South Wales, Victoria and Tasmania.

PROPAGATION
Trailing jointweed is not easily propagated.



Samolus junceus
a Brookweed
(Primulaceae)

LEAVES
The sparse blue-green leaves are alternate. The basal leaves are oblong, 20-40 mm long and 3-12 mm wide. Up the stems, they become smaller in size with the uppermost being only 1-5 mm long.

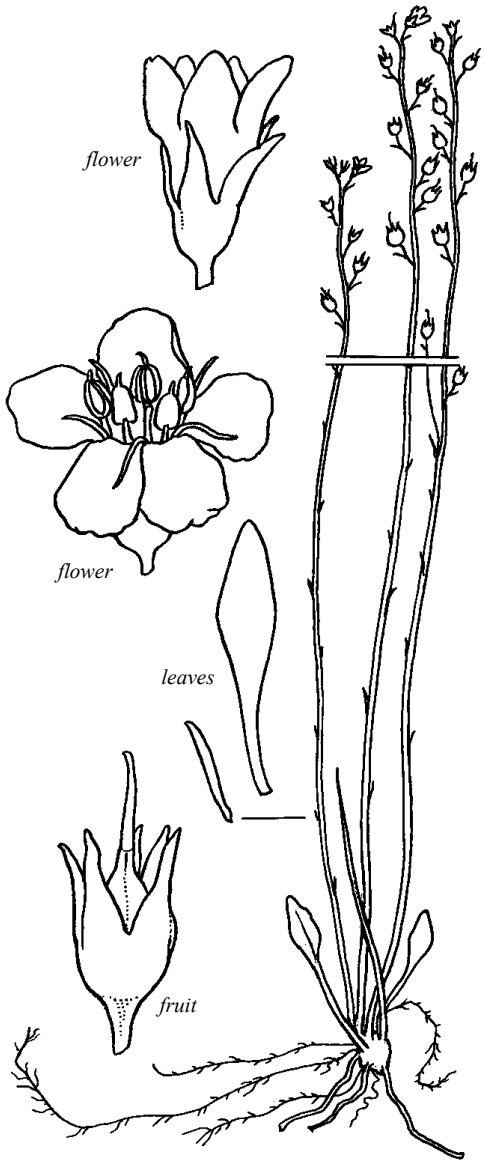
FLOWERS
The white to pink flowers are on slender stalks. Each flower is 5-10 mm across and has 5 petals 5-7 mm long.

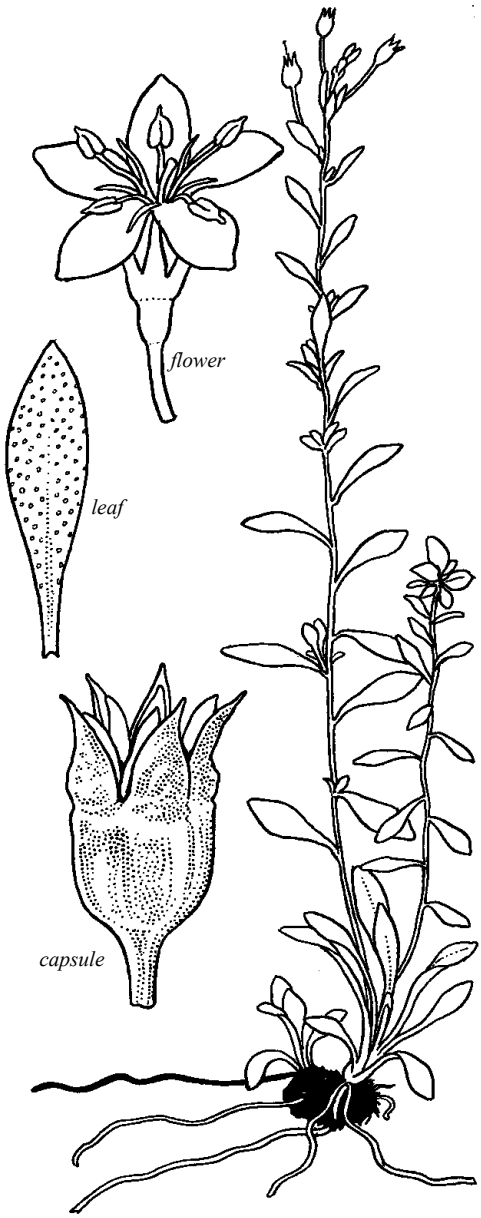
FRUITS
The fruit is a small spherical capsule opening by 5 valves.

FLOWERING TIME
Flowers spring and early summer.

GROWTH FORM AND HABITAT
A perennial herb with erect stems up to 0.5 m high, arising from tufts or a creeping rootstock. It occurs in wet situations fringing estuaries, watercourses and lakes, from Gingin to Cape Arid.

PROPAGATION
This species can be propagated by planting the creeping rootstock.





Samolus repens
Creeping brookweed
(Primulaceae)

LEAVES
The stems are leafy. The basal leaves are oblong in shape, 20-40 mm long and 3-12 mm wide. The stem leaves are smaller, the uppermost only 3-8 mm long.

FLOWERS
The flowers are white sometimes tinged pink and are on slender stalks.
Each flower is 5-10 mm across and has 5 petals 4-7 mm long.

FRUITS
The fruit is a small spherical capsule opening by 5 valves.

FLOWERING TIME
Flowers much of the year.

GROWTH FORM AND HABITAT
Creeping brookweed is a perennial herb with erect stems up to 0.5 m high and a creeping rootstock. It occurs near fresh, saline or brackish water from Carnarvon to Perth. Also occurs in South Australia and Victoria.

PROPAGATION
Creeping brookweed can be propagated by transplanting the creeping rootstock.

Suaeda australis
Seablite
(Chenopodiaceae)

LEAVES
The leaves are red or somewhat purple, succulent and alternately arranged along the stems. They are 10-30 mm long and may be either slender or rather thick.

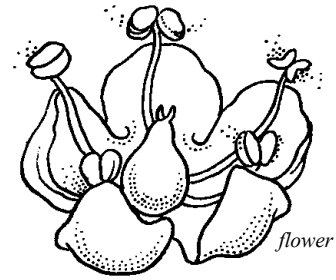
FLOWERS
The small flowers are arranged in clusters along a terminal spike. There are 3-5 flowers in each cluster. The flowers are green and approximately 1.5 mm in diameter with 5 somewhat succulent segments.

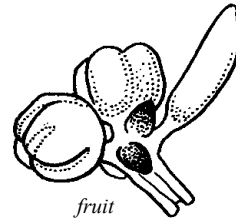
FRUITS
The fruit is surrounded by the enlarged and brittle floral segments. The seed is reddish brown, smooth and glossy, and 1 mm in diameter.

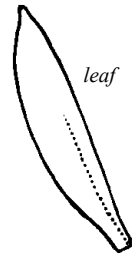
FLOWERING TIME
Flowers from summer to early winter.

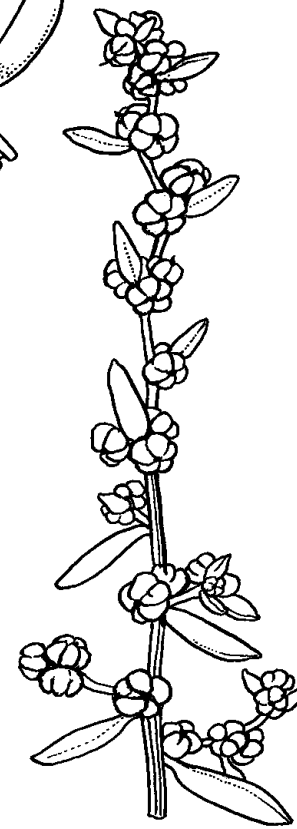
GROWTH FORM AND HABITAT
Seablite is a shrub up to 1 m high. It occurs on saline soil around estuaries and winter-wet depressions, extending from the Abrolhos Islands to Israelite Bay. Also occurs in all Australian States except the Northern Territory.

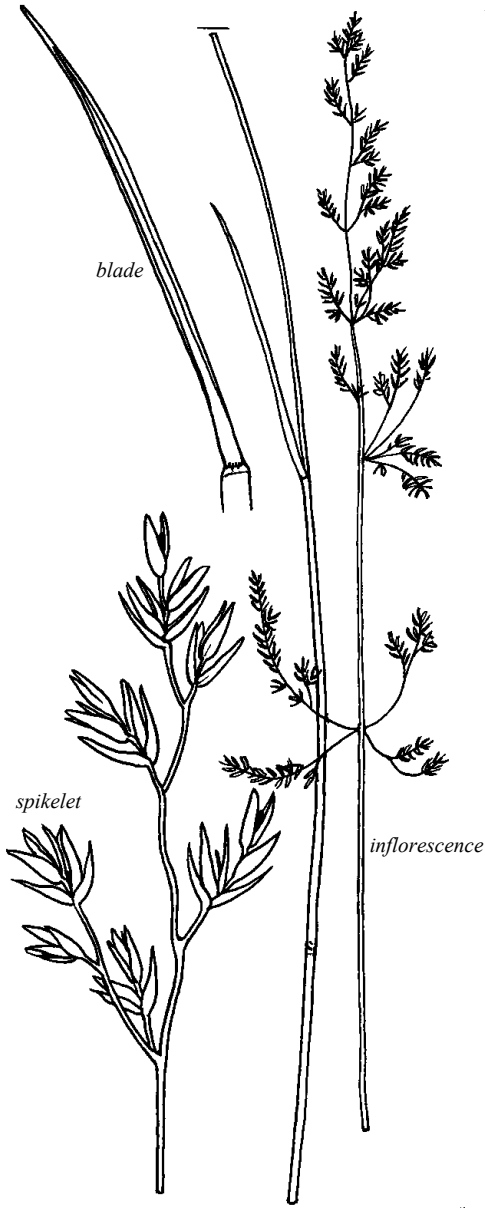
PROPAGATION
Seablite can be propagated by seed.











Poa porphyroclados
(Poaceae)

LEAVES
The leaf blades are rigid and inrolled so that they are almost circular in cross section. The blades are 130-140 mm long and 0.3-0.4 mm wide. There is a tiny, fringed rim at the junction of the leaf sheath and blade.

FLOWERS
The loose inflorescence is light green or purplish with numerous compressed spikelets. The spikelets are 4-7 mm long, each containing 3-5 small flowers.

FLOWERING TIME
Flowers in spring.

GROWTH FORM AND HABITAT
A tufted perennial grass which is 0.4-0.9 m tall. The grass readily invades and often predominates regularly burnt vegetation. It is found on floodways, winter-wet flats, swamps, and estuaries in brackish to saline conditions. It occurs from Perth to Cape le Grand.

PROPAGATION
This species can be propagated by seed.

Sporobolus virginicus
Marine couch
(Poaceae)

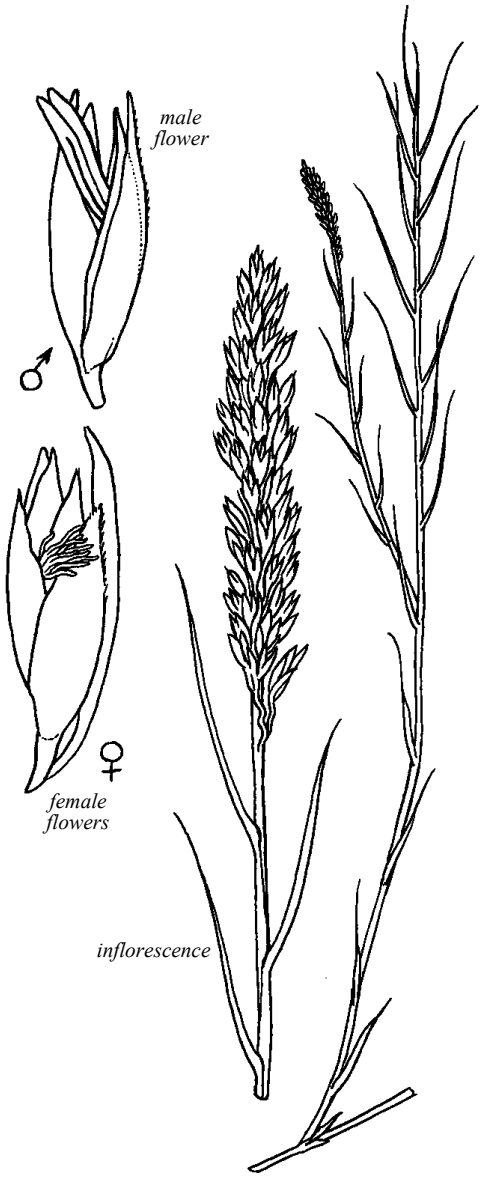
LEAVES
The leaves appear opposite due to alternately long and short nodes.
The blades are up to 50 mm long, narrow and rigid with inrolled margins so that they are almost circular in cross section. There is a small, membranous fringed rim at the junction of the leaf sheath and blade.

FLOWERS
The narrow inflorescence is dark grey with many small single-flowered spikelets 2-2.5 mm long.

FLOWERING TIME
Flowers throughout the year.

GROWTH FORM AND HABITAT
Marine couch is a perennial grass 0.1-0.4 m tall with numerous thick creeping scaly stems. Occurs in salt marshes and close to the coast from Pilbara to Bunbury, and also in the Kimberley area. It also occurs in all Australian States.

PROPAGATION
Marine couch can be propagated by seed or from the creeping stems.



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GLOSSARY

Blade.....The actual "leaf" which arises above the leaf stalk or leaf sheath.
Biennial.....Completing the life span and then dying in more than one but not more than two years.
Brackish water.....Water with a range of over 3 and up to 10 parts per thousand (ppt) Total Dissolved Salts (TDS) all year, except for seasonal rains when salinity can fall below 3 ppt TDS.
Bract.....Asmall leaf-like structure in the inflorescence.
Catkin.....Aspike-like arrangement of unisexual flowers
Capsule.....Adry fruit splitting open to release seeds at maturity.
Direct seeding.....Seeds sown in large quantities at the chosen site so that they germinate and grow without cultivation.
Freshwater.....Water with less than 3 parts per thousand (ppt) Total Dissolved Salts (TDS) all year.
Inflorescence.....The flowering part of the plant.
In-vitro.....In an artificial environment.
Littoral zone.....The intertidal area of land between the high and low water marks.
Node.....Apoint where leaves are attached.
Nut.....The dry and hard fruit which does not split open to release seed at maturity.
Perennial.....With a life span extending over more than two growing seasons.
Petal.....One of the segments of the usually coloured floral whorl.
Rhizome.....An underground stem running parallel to the soil surface and bearing leaves and roots.
Saline water.....Water with a range of over 10 and up to 50 parts per thousand (ppt) Total Dissolved Salts (TDS) all year, except for after seasonal rains when salinity can fall below 10 ppt TDS.
Salinity.....The measure of the total soluble (or dissolved) salt, i.e. mineral constituents in water.
Seed.....The reproductive body formed from a fertilised cell with a surrounding seed coat.
Sheath.....Astructure which clasps the stem.
Spike.....An unbranched inflorescence of unstalked flowers or spikelets.
Spikelets.....The grass flower heads composed of two bracts and one to several flowers. Also spike-like inflorescence of sedges.
Stamen.....One of the male organs of the flower, consisting typically of a stalk (filament) and a pollen-bearing portion (anther).
Style.....The elongated tip of the female organ of the flower.
Valve.....The specialised opening of a fruit or nut.

NOTE: Water salinity in this booklet is defined according to Halse *et al* (1993) who classify salinity according to biological parameters. The amount of total dissolved salts in water classified fresh for drinking and other health standrads will be much less than 3 ppt TDS.

Typical fringing vegetation of saline and brackish rivers and estuaries of the lower south-west of Western Australia