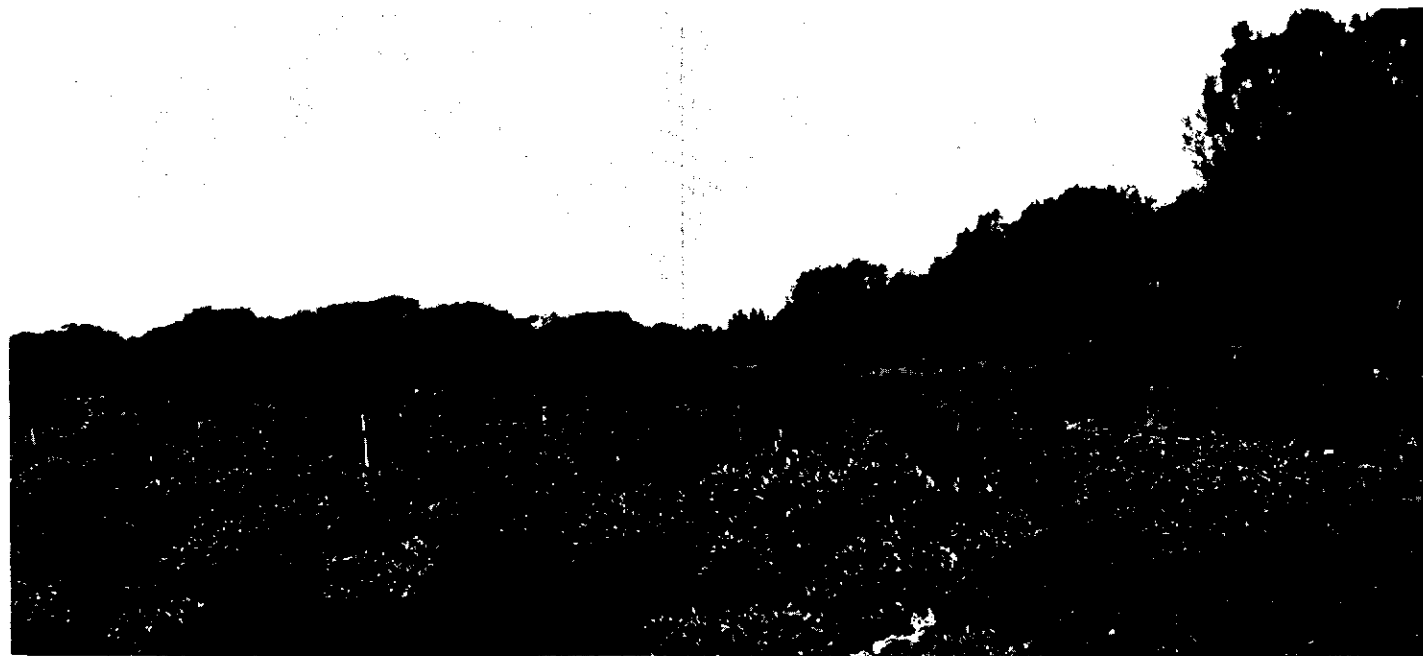


SALTMARSH PLANTS OF NEW SOUTH WALES

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NSW coastal saltmarsh, predominantly *Sarcocornia quinqueflora* with scattered *Avicennia marina*. The change through rush swamp to *Casuarina* woodland can be seen on the right.

A better basis for extrapolation would be from Mediterranean communities but suitable data are not available. It seems likely that productivity of chenopod shrub saltmarshes is much lower than that of American *Spartina* marshes. The only estimates of productivity for Australian saltmarsh are given by Congdon and McComb (1980a) for *Juncus kraussii* marsh in the Blackwood estuary. Their estimates for net above ground production range from 0.3-1.3 kg dry wt m⁻² yr⁻¹, the higher figures being in the mid to upper range of estimates for saltmarshes and freshwater macrophytes but well below the maximum recorded from American marshes.

Given the relatively small extent of coastal saltmarsh and the nature of the vegetation it seems likely that their potential contribution to detritus food chains will be small but there is a need for actual data from Australian marshes rather than reliance on overseas estimates. While quantitative exchanges between saltmarshes and estuaries may be small, quality may be important. Exchanges of nutrients (for example nitrogen and phosphorus) could be essential for the function of estuarine ecosystems but again research is urgently needed.

While it is difficult at this stage to justify generalisations about exchanges between saltmarshes and estuaries our ignorance in the face of their possible importance ought to lead to counsel of caution in any proposed development. In other respects, we can be more certain of the importance of saltmarshes. They are an important habitat for birds, particularly waders and to many people are an intrinsically attractive part of the coastal scene (despite Hamilton's [1919] description of a marsh as a "monotonous stretch of dull green, stunted herbage").

The saltmarsh biota is superbly adapted to its environment. We are only just beginning to understand the details of the processes by which these adaptations are achieved. Greater knowledge of the species, of interest in its own right, may prove to be of wider applicability. For example, it has been suggested that understanding of the mechanisms of salt tolerance of wild plant species may lead to the development of new crop species and varieties for salinised semi-arid agricultural lands. This speculation may be overly optimistic but saltmarshes will provide natural laboratories for such research. The relative species paucity of saltmarsh plant communities makes them ideal for teaching purposes. Saltmarshes provide good demonstrations of zonation and offer opportunities for the study of succession.

Before we can fully appreciate the value of saltmarshes, much research is required. However, before this is likely to occur, many marshes will have changed. In addition to the obvious reclamation, some forces acting on marshes may be less apparent. Pollution, both chronic and acute, affects many marshes, little is known of its effects. Regulation of the flow of rivers into estuaries will reduce the range of conditions experienced by the marshes. It is impossible to predict what effect this will have but it emphasises the difficulty of accounting for the effects man has on ecosystems. Few, if any marshes, are still in a completely natural state, true control sites probably do not exist and our base line for comparison is continually changing.

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The flora of saltmarshes is, when compared with that of other habitats, small. In the Sydney region the bulk of the biomass on saltmarshes is provided by about half a dozen species. The total saltmarsh flora is much larger but imperfectly documented.

This paper provides a Key to saltmarsh species in NSW — using it, it should be possible to identify at least the most common and widespread species on saltmarshes around Sydney. However, the Key makes no pretensions to completeness; many more species will be present on some saltmarshes. To identify these the user is advised to turn to a more comprehensive flora such as Beadle, Evans and Carolin (1972); the extensively illustrated guide by Galbraith (1977) will also prove useful.

Peter Bridgewater (1974) provided a Key to saltmarsh species in all the southern states which should be consulted for information of the wider distribution of species. This Key included a number of species which are absent from NSW coastal saltmarshes; interestingly many of these species are found in saline habitats in western NSW. A striking suite of species absent in NSW marshes are the succulent shrubby chenopods in the genera *Sclerostegia* and *Halosarcia* (both formerly in *Arthrocnemum* — see Wilson 1980) which are important community dominants in the other mainland states.

All species likely to be found in the mid and lower marsh zones in NSW are included in the current Key. (A possible exception is *Puccinellia stricta* (Hook.f.) C. Blom a loosely tufted grass locally common in the other southern states: as it occurs just south of the NSW border it may well be found on the south coast of NSW. A number of introduced *Puccinellia* spp. have been used in soil conservation projects and might also be found in coastal saltmarshes). The species of the upper margin of the saltmarshes are less well covered in the Key although all widespread dominants in these communities should be included.

The number of species potentially capable of occurring in the upper marsh is large but the actual flora of the habitat is poorly documented.

A number of different marginal assemblages can be recognized:—

Open vegetation on dry well drained sand: The majority of species are introduced, *Parapholis incurva* and *Plantago coronopus* are most frequent but many other introduced annual grasses and herbs may occur.

Drift line of rotting organic material (often washed up seagrasses and algae): The vegetation in this habitat tends to consist of small discontinuous patches dominated by single species with great variation in species

composition between sites. The most frequent species are annual, or short-lived perennial, members of the family Chenopodiaceae. In addition to those species in this group covered in the Key other *Atriplex* spp. and *Chenopodium* spp. are likely to occur. Species from the drift line of sandy beaches might also be found and a number of alien species (including several composites) also occur.

Areas flushed by freshwater supporting low growing vegetation: These communities are often fairly open, a number of small sedges and rushes are found, *Cotula* spp. and other herbs also occur. Around Sydney one of the most frequent species is a diminutive sedge *Scirpus cernuus*, 3-5cm tall, but other superficially similar species in the same and related genera also occur. Recorded herbs included the creeping white flowered *Bacopa monniera* and the bluish purple flowered *Mimulus repens*. It would be difficult to include many species from this habitat in the Key without a full species list being available — the user is referred to Beadle *et al.* (1972). One genus represented in this habitat, but also found in dry open places, is *Centrolepis*, superficially like a small sedge some 3-5cm high, but in fact a member of a small family, the Centrolepidaceae.

Tall swamps: In the more saline marshes the two major dominants of these communities are *Juncus kraussii* and *Baumea juncea*, around brackish lagoons a number of members of the Cyperaceae may be important. A number of other *Juncus* spp. also occur but these are difficult to identify using currently available floras. A rich understory of small sedges and a variety of creeping herbs may also be present but has been little investigated. At least around Sydney members of the family Restionaceae do not seem very common in the more saline swamps. They may be distinguished when vegetative from the superficially similar sedges of the Cyperaceae by looking at the leaf sheath. In the sedges when the leaves are reduced to scales the sheathing leaf base around the stem is entire and tubular, in the Restionaceae where all leaves are reduced the leaf sheath is split on one side.

The majority of species on saltmarshes are also found in other habitats — sand dune, sea cliffs, swamps. Many species from inland habitats may, where populations are found close to the sea, locally invade the upper marsh. Thus, despite the basic similarity in terms of major community dominants between all saltmarshes, there may be great diversity when the total floras of sites are compared.

Throughout the Key scientific (Latin) names are used in preference to vernacular names. Unfortunately many saltmarsh species do not have a common name and even those common names that do exist are not unambiguous; for example, both *Sporobolus virginicus* and *Paspalum vaginatum* have been called "saltwater couch".

ARTIFICIAL KEY TO SPECIES OF COASTAL SALTMARSHES IN NEW SOUTH WALES

- Plants with definite woody stems at least at bases (generally of shrubby appearance but may be prostrate) — 1
- Plants herbaceous but not graminoid — 2
- (a number of species will key out under both 1 and 2)
- Plants graminoid (grass-like — grasses, rushes, sedges) — 3

1 Plants with woody stems

1. Stems prostrate, with erect apparently leafless succulent branches. *Sarcocornia quinqueflora*
Stems leafy. 2
2. Leaves small 'heath'-like, dark green or grey green with recurved margins, lower leaves opposite, upper leaves often whorled. Flowers pale pink or white. *Frankenia pauciflora*
Not as above. 3
3. Leaves linear, alternate fleshy 4
Leaves with flattened laminae 8

4. Leaves with sharp point at tip. Plant normally up to 50cm — sometimes to 1m. Leaves softer and up to 3cm on younger parts, harder and up to 1cm on older. Flowers sessile, axillary. *Salsola kali*
Leaves lacking sharp points 5
5. Plant shrubby, up to 1m 6
Plant procumbent, rarely more than 25cm high. 7
6. Erect shrubby plant up to 1m tall, glabrous, stems generally rather soft and only woody towards base. Leaves 1-4cm long, new growth often a rather bright yellowish green, older growth becoming reddish or purple *Suaeda australis*
Shrub to 1m, leaves, and often stem, tomentose (densely covered with short hairs). Leaves 0.5-1.5cm long. Flowers solitary, axillary, perianth enlarging and becoming fleshy after flowering — red or yellow in colour, going black on drying. *Enchylaena tomentosa*

7. Small procumbent plant, woody at base, leaves 0.5-1.5cm long, rather crowded, dark green. Flowers, solitary, axillary with a white tubular corolla with reflexed lobes. *Wilsonia backhousei*
Stems creeping with erect short branches. Leaves 0.5-1.5cm long, becoming vivid orange (less often tinged with purple) in late summer. Flowers small, inconspicuous, solitary, sessile in leaf axils, petals absent, sepals slightly tinged with pink on the inside. *Hemichroa pentandra*
8. Fruit a red berry about 4mm in diameter. (Flowers and fruit normally present throughout year.) Straggly shrub to 1m, leaves ovate to lanceolate, 1-3cm long, green but paler beneath. *Rhagodia baccata*
Fruit not a berry. 9
9. Leaves hastate (arrowhead shaped) to ovate 2-4cm long, green, glabrous. Straggly branches to 50cm high (rarely taller), slightly woody at base. *Atriplex hastata*
Leaves lanceolate to oblong. 10
10. Leaves oblong-lanceolate, rounded tip, 2-6cm long. Tall, sometimes straggling shrub (up to 1.5m). Whole plant grey coloured and mealy (scurfy). *Atriplex cinerea*
Leaves linear to lanceolate, 3-10cm long, entire or toothed, lower leaves sometimes hastate. Leaves green or mealy. Up to 1m tall but often straggling, woody near base. *Atriplex australasica*

2 Herbaceous plants

1. Plants with obvious leaves. 2
Apparently leafless, stems composed of succulent sections. *Sarcocornia quinqueflora*
2. Leaves peltate (umbrella shaped), dark shiny green, plants rhizomatous or stoloniferous, white flowers borne in compound umbels. *Hydrocotyle bonariensis*
Not as above. 3
3. Leaves very fleshy, triangular in section, 3-10cm long, stems creeping, rooting at nodes. Flowers with showy purple (white at base) staminodes (sterile petaloid stamens). *Carpobrotus glaucescens*
Not as above. 4
4. Plant with basal rosette of leaves. 5
Plant without basal rosette of leaves. 9
5. Leaves distinctly toothed to pinnatifid, often hairy — flower stalks leafless bearing a dense spike of small flowers. *Plantago coronopus*
Not as above. 6
6. Erect flowering stems with opposite, sessile elliptical leaves 1-2cm long — stems quadrangular, flowers tubular with spreading lobes, pink. Plant up to 20-30cm high. *Centaurium erythraea*
Not as above. 7
7. Leaves oblong, 3-10cm long, dark green, glabrous, in dense rosette. Flowering stem leafless, 10-50cm high, repeatedly forked and bearing dense one sided spikes of flowers, sepals dry and membranous, pale pink with the yellow petals not or scarcely projecting beyond the sepals. *Limonium australe*
Not as above. 8
8. Rosette leaves rather thick, obovate to oblong, up to 4cm long, stems variable — either stoloniferous (often red tinged), rooting at nodes and bearing daughter rosettes or erect and flowering. Stem leaves much smaller, up to 1cm, narrower and more pointed. Flowers variable, up to 1cm diameter, white or pale pink. *Samolus repens*
Plant creeping, with no erect stems, rooting at nodes. Leaves spatulate (spoon shaped) to ovate, 2-8cm long, occasionally a number of leaves arising close together giving superficial appearance of a rosette but normally separated. Flowers single or few together, axillary, white, fan-shaped. *Selliera radicans*
9. Flowers (strictly inflorescences) borne singly on stalks, yellow, button like. 10
Not as above. 11

10. Leaves entire or coarsely dissected, succulent, leaf base sheathing stem. *Cotula coronopifolia*
Leaves pinnate, base not sheathing, up to 10cm long, stems creeping. *Cotula reptans*
11. Leaves linear. 12
Leaves not linear. 15
12. Leaves with sharp point at tip, plant up to 50cm high, sometimes larger. Flowers small, sessile axillary. *Salsola kali*
Not as above. 13
13. Leaves opposite, 1-3cm long, somewhat fleshy with small papery stipules at junction of stem and leaf. Small herb up to 20cm, sometimes prostrate, flowers in cymes, petals longer or shorter than sepals, colour varying from pink to white. *Spergularia* sp. 14
Leaves alternate. 14
14. Erect bushy plant up to 1m tall, leaves 1-4cm long, new growth bright yellowish green, often becoming reddish or purple. *Suaeda australis*
Small procumbent plant, up to 25cm high, leaves 0.5-1.5cm long, rather crowded, dark green. Flowers solitary, axillary with a white tubular corolla with reflexed lobes. *Wilsonia backhousei*
15. Leaves opposite, sessile, oblong to elliptic with a few distinct subparallel veins. Generally 15-30cm tall but may be minute (2-3cm). Flowers in cymose inflorescences (solitary in very small plants) pink. *Centaurium* spp. 16
Not as above. 16
16. Tall herb (up to 2m), leaves sessile up to 12cm long — 1cm wide, toothed or entire, flower-heads small, "daisy" like, rays white, pale pink or blue, in loose leafy panicles. *Aster subulatus*
Not as above. 17
17. Leaves deeply divided (once or twice pinnatisect, segments tripartite) small herbs with short rootstock, stem often prostrate sometimes ascending, stems hollow, foliage with slight "carrot" smell when crushed. Inflorescence a compound umbel of small white flowers. *Apium prostratum*
Not as above. 18
18. Stem creeping, rooting at nodes, leaves spatulate (spoon shaped) to ovate, 2-8cm long. Flowers single or few together, axillary, white, fan-shaped. *Selliera radicans*
Not as above. 19
19. Leaves hastate (arrowhead shaped) to ovate, opposite or alternate, 2-4cm long, green, glabrous. Straggly branches to 50cm (rarely taller) slightly woody at base. *Atriplex hastata*
Leaves linear to lanceolate, 3-10cm long (lower leaves sometimes hastate) entire or toothed. Leaves green or mealy. Up to 1m tall but sometimes straggly and decumbent. *Atriplex australasica*

3 Graminoid plants

1. Plants with vertical stems to 50cm or taller. 2
Plants shorter than 50cm, tufted or creeping. 5
2. Stems triangular, bearing long flat (but keeled) leaves. Stout plant (to 1m), stem arising from rhizome, often loosely tufted. *Scirpus maritimus/fluviatilis*
Stems not as above. 3
3. Flowering head globular, apparently lateral (some 10cm below tip of apparent stem), stems shiny green to 70cm, often in loose tussocks. *Scirpus nodosus*
Not as above. 4
4. Flowering stems to 1.5m (generally around 1m), inflorescence a cymose panicle, 8-15cm long, leaves restricted to basal parts of stems about 10cm long. Stems dark green. *Juncus kraussii*
Stems slender, rigid, to 70cm. Inflorescence 10-40cm long of few spikelets which are sessile on short branches. Leaves reduced to tightly sheathing scales. Stems dingy grey. *Baumea juncea*
5. Leaves filiform, few borne as a loose 'tuft' on a creeping rhizome. Inflorescence a spike with individual flowers somewhat separated, fruit a globular group of three follicles. Often minute (less than 5cm) rarely to 30cm. *Triglochin striata*

- Not as above (grasses). 6
6. Spikelets more or less sunk into the stalk of the inflorescence. 7
Inflorescence not as above. 8
7. Glumes 2, side by side at base of spikelet, tufted plant with the stem curving upwards and inwards (in shaded situations may be much straighter). *Parapholis incurva*
Glume single (except in terminal spikelet), inflorescence straight or only slightly curved. *Monerma cylindrica*
8. Inflorescence a large very loose panicle, rather brittle and in fruiting stage blowing away whole. Leaf blades about 20cm long, up to 1cm wide at base, lanceolate, rather grey-green often tinged purple. *Agrostis billardieri*
Not as above. 9
9. Inflorescence bifurcating into 2 equal racemes, rhizomatous or stoloniferous, leaves up to 15cm long, dark green. *Paspalum vaginatum*
Not as above. 10
10. Inflorescence a dense, cylindrical, spike-like panicle. Florets with a fine awn (bristle arising from the glume — part of the flower). *Polyopogon monspeliensis*
Not as above. 11
11. Spikelets of one floret, sessile and appressed to notched rachis. Inflorescence dark brown in colour. Leaves of stiff texture, sometimes with sharp pointed tips. Ligule (out growth on upper side of leaf blade at leaf/stem junction) of fine hairs. *Zoysia macrantha*
Inflorescence a dense, spike-like panicle, of numerous small spikelets, light to dark grey coloured. Ligule small, membranous sometimes fringed with hairs. Stems rhizomatous or stoloniferous. *Sporobolus virginicus*



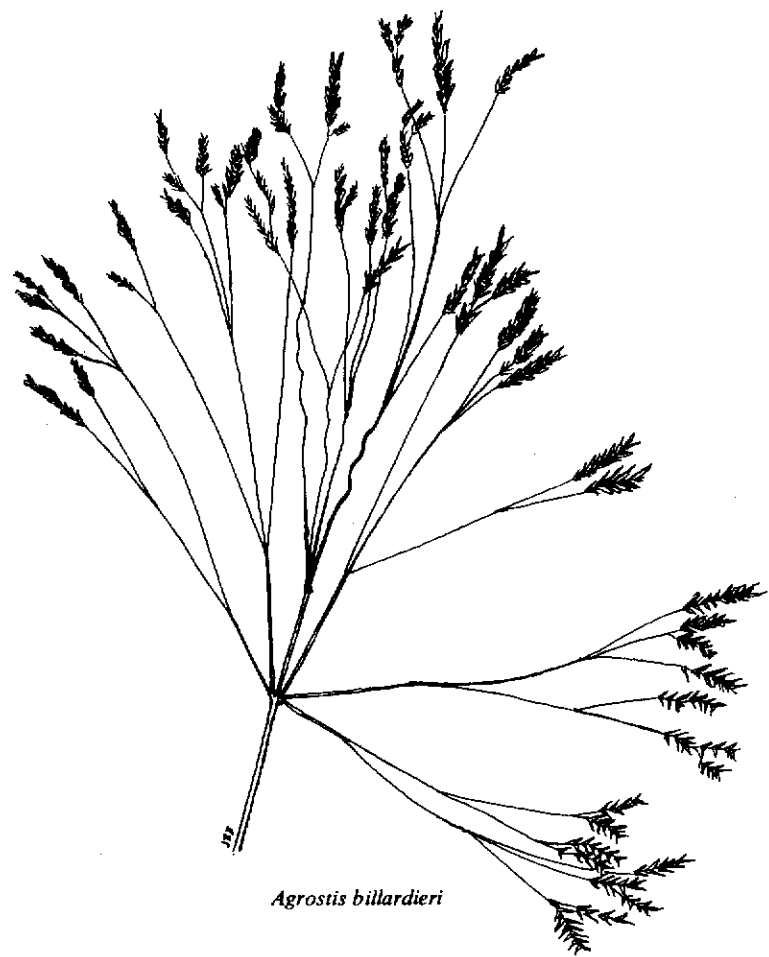
Aster subulatus

Notes on species

- Agrostis billardieri* R. Br. (Gramineae).
Annual grass, widespread but rarely abundant in the upper marsh in both areas subject to freshwater influence and drier sandy sites. Also found in brackish seepage sites on cliff tops. Two other species with similar large, open, wind dispersed panicles are found less frequently in the upper marsh — *A. aemula* R. Br. and *A. avenacea* Gmel.
- Apium prostratum* Labill. ex Vent. (Umbelliferae).
A small member of the carrot family, widespread in the upper marsh — often amongst *Juncus kraussii*. Generally in damper sites but occasionally in dry sandy areas. The related *Apium* (*Ciclospermum*) *leptophyllum* (Pers.) F. Muell. with filiform leaf segments and erect stems occurs less frequently in the upper marsh.
- Aster subulatus* Michx. (Compositae).
Introduced from America, a widespread species in upper saltmarshes, particularly *Juncus kraussii* stands, generally in permanently wet areas.
- Atriplex australasica* Moq. (Chenopodiaceae).
Upper saltmarsh. Often associated with the drift line, generally on well drained sandy soils. Scattered, widespread but rarely common on saltmarshes. Annual but sometimes woody towards the base.
- Atriplex cinerea* Poir. (Chenopodiaceae).
Tall shrub at the upper edge of the saltmarsh, at or above the tidal limit on well drained substrates. Widespread but local.
- Atriplex hastata* L. (Chenopodiaceae).
Introduced from the northern hemisphere. An annual but sometimes woody towards base. On drift litter at the upper edge of the saltmarsh, smaller plants scattered in upper marsh communities.
- Baumea juncea* (R. Br.) Palla. (Cyperaceae).
Often grows in dense stands or mixed with *J. kraussii* in the upper marsh in permanently moist sites.
- Carpobrotus glaucescens* (Haw.) Schwantes (Aizoaceae).
Pig-face. At the upper limit of saltmarsh (probably above all but storm tides) in open sandy communities. The introduced *Hottentot Fig. C. edulis* (L.) N.E. Br., with yellow, rather than purple, staminodes may occur in the same habitat.



Atriplex hastata



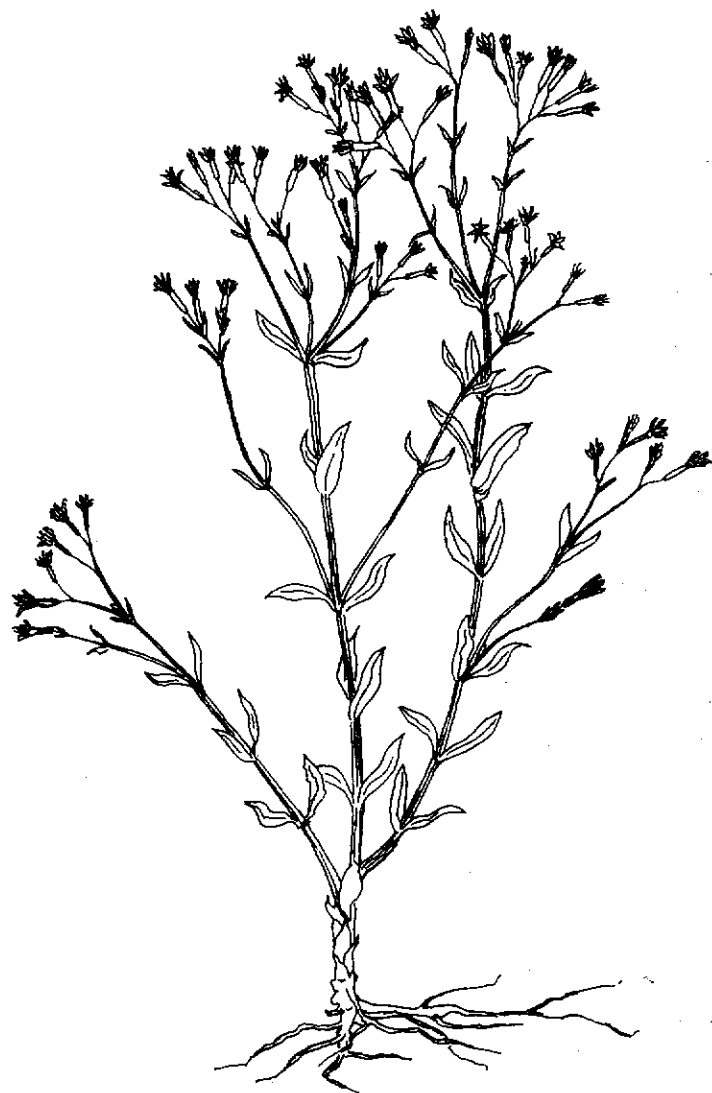
Agrostis billardieri



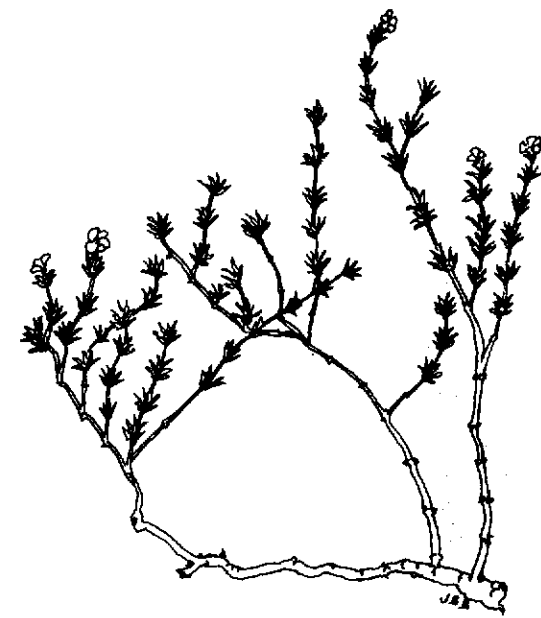
Baumea juncea



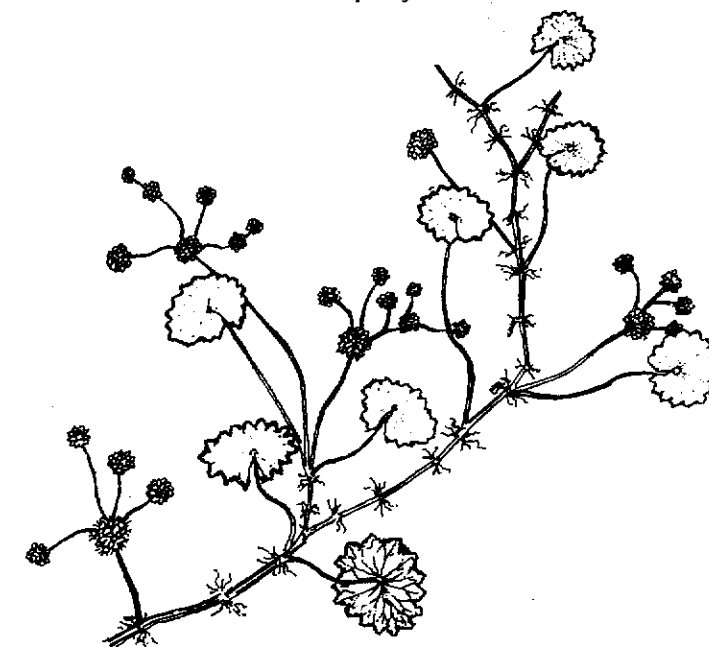
Cotula coronopifolia



Centaurium spicatum



Frankenia pauciflora



Hydrocotyle bonariensis



Juncus kraussii

Centaurium spp. (Gentianaceae).

Three species of *Centaurium* occur in dry sandy sites in upper saltmarshes in central NSW. All are annual herbs which when well grown are 25-30cm tall but in the upper marsh are often stunted and can be difficult to identify to species level. One species *C. spicatum* (L.) Fritsch is native, the others are introduced from Europe. The species may be distinguished as follows:

1. Basal rosette of leaves always present, flowers light red, corolla tube clearly longer than calyx. *C. erythraea* Rafn.
Not as above

2. Basal rosette absent at time of flowering (some of the basal leaves may persist, but not as a complete rosette) flowers light pink, corolla tube slightly longer than calyx. Leaves elliptical. *C. spicatum* (L.) Fritsch
Basal rosette absent, flowers deep pink to red (often with a grey blue tinge to it) corolla tube slightly longer than calyx. Leaves oblong-elliptical. *C. tenuiflorum* (Hoffn. et Link) Fritsch.

The differences in the nature of the inflorescence between species given in floras may be applied to well grown specimens but are often inapplicable to stunted saltmarsh specimens with only one or two flowers.

Another introduced species occurring widely in the same habitat is *C. pulchellum* (Swartz) Druce. This has not been recorded in the Sydney region — it is very similar to *C. tenuiflorum* and stunted specimens of the two species would be very difficult to tell apart. Well grown examples may be distinguished as follows:

- 2-4 internodes on stem, branches of stem diverging at a wide angle. *C. pulchellum*

- 2-5 internodes on stem, branches of stem diverging at narrow angle. *C. tenuiflorum*

Cotula coronopifolia L. (Compositae).

Markedly succulent herb characteristic of wet sites, generally influenced by freshwater run-off. Can survive for long periods submerged at the edge of brackish creeks.

Cotula reptans Benth. (Compositae).

Creeping perennial with pinnate leaves. Found in similar habitats to *C. coronopifolia*.

Enchylaena tomentosa R. Br. (Chenopodiaceae).

A diffuse or compact tomentose shrub found in drier upper saltmarshes at or above the tidal limit. Scattered.

Frankenia pauciflora D.C. (Frankeniaceae).

An attractive dwarf shrub found in drier saltmarsh communities. A widespread and locally abundant in the other southern states it does not occur in the Sydney region but may possibly be found on the coast elsewhere in the state.

Hemichroa pentandra R. Br. (Amaranthaceae).

Found in the wetter parts of saltmarshes, either as community dominant or mixed with *Sarcocornia quinqueflora*. Widespread and locally abundant in the other southern states it is absent from the Sydney region but has been recorded from the south coast of NSW.

Hydrocotyle bonariensis Lam. (Umbelliferae).

Introduced from South America. Widespread and sometimes abundant in upper marsh communities. Large plants are found in moister communities and smaller more succulent specimens in drier sandier sites.

Juncus kraussii Hochst. (Juncaceae).

A tall rush, frequently the community dominant in the upper marsh. May be found both in sites subject to fresh or brackish run-off and dry, well drained areas. Around brackish lagoons may form a community which is permanently flooded for much of the year.

Limonium australe (R. Br.) Kuntze (Plumbaginaceae).

Rare in NSW, the nearest record to Sydney is from Kiama. A number of European species of *Limonium* are naturalised in Australia and occur in upper saltmarsh communities in, for example, S.A. These species may yet appear in NSW.

Monerma cylindrica (Willd.) Coss. et Durieu (Gramineae).

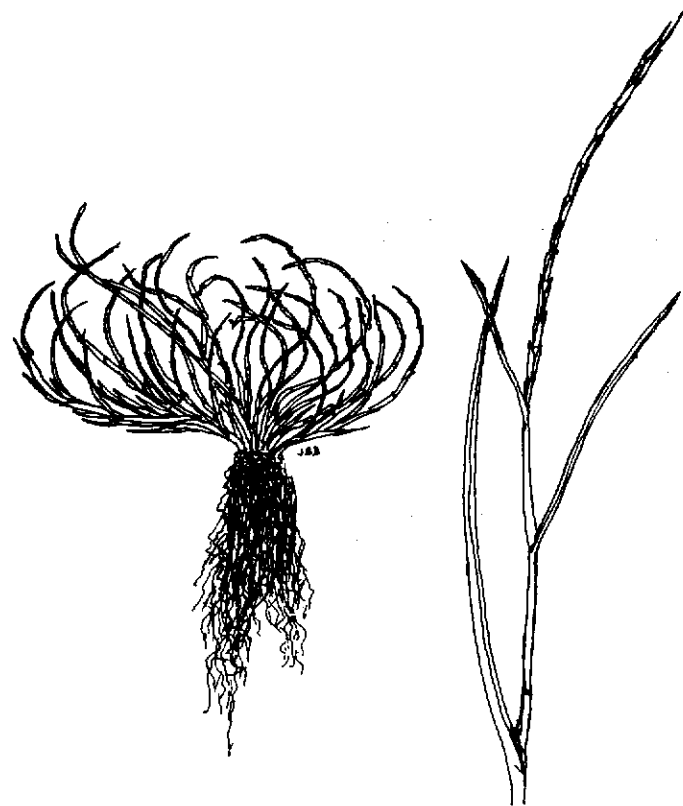
Introduced from the Mediterranean region. Occurs in upper saltmarsh communities but much less commonly than the similar *Parapholis incurva*.

Parapholis incurva (L.) C.E. Hubbard (Gramineae).

Introduced from Europe. Widespread in upper marsh communities. The mostly tightly 'incurved' examples are found in open dry sandy communities; straighter, taller specimens are found in closed vegetation. Also abundant in waste sites close to the sea and on cliff tops.

Paspalum vaginatum Swartz (Gramineae).

Common in brackish areas, may form extensive almost pure stands. In more saline marshes restricted to the upper zones where flushing with fresh water occurs, in more uniformly brackish sites may be found throughout the marsh.



Parapholis incurva



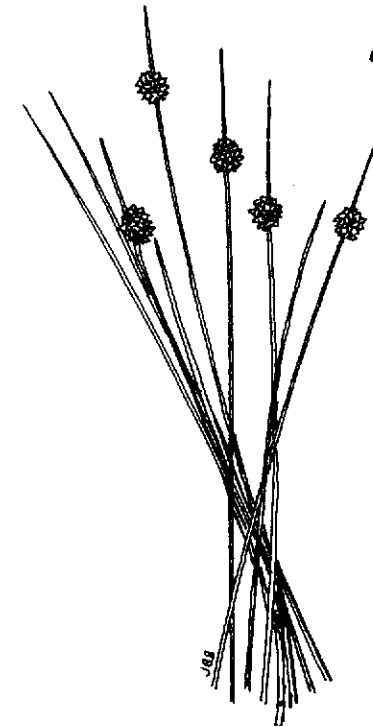
Paspalum vaginatum



Polypogon monspeliensis



Selliera radicans



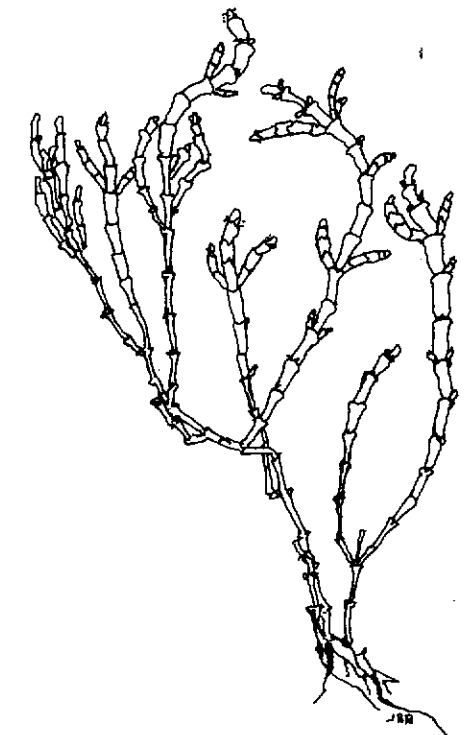
Scirpus nodosus



Plantago coronopus



Samolus repens



Sarcocornia quinqueflora

Plantago coronopus L. (Plantaginaceae).

Introduced from the northern hemisphere. Very variable in size, degree of dissection of leaves and hairiness. Annual or biennial, favouring disturbed sites, often accompanying *Parapholis incurva*.

Polypogon monspeliensis (L.) Desf. (Gramineae).

Introduced annual grass from the northern hemisphere. Widespread in upper marsh communities, generally in damp sites. (In drier open upper marsh fringes and other introduced grass, *Lagurus ovatus* L., with a dense ovoid spike with prominent awns [rabbit's tail] may occur.)

Rhagodia baccata (Labill.) Moq. (Chenopodiaceae).

A straggling shrub, sometimes growing over other shrubs. At and above the tidal limit particularly in sandy or rocky sites.

Salsola kali L. (Chenopodiaceae).

A cosmopolitan species found in sandy open communities at the upper edge of the marsh.

Samolus repens (Forst. et f.) Pers. (Primulaceae).

A very variable species, widespread and found in most saltmarsh communities as a minor constituent, occasionally occurs in abundance.

Sarcocornia quinqueflora (Bunge ex Ungern-Sternberg) A.J. Scott (Chenopodiaceae).

Samphire or Glasswort — previously included in the genera *Salicornia* or *Arthrocnemum*. A herb of creeping undershrub with succulent jointed stems, often tinged reddish. Often the only vascular plant in the lower saltmarsh it is found through the mid and lower saltmarsh zones particularly in wetter areas.

Scirpus maritimus L. & *S. fluviatilis* A. Gray (Cyperaceae).

These two species are difficult to tell apart without examination of the fruit under a hand lens or binocular microscope. Upper saltmarsh, or fringing lagoons, generally with shallow standing water for a large part of the year.

Scirpus nodosus Rottb. (Cyperaceae).

Upper saltmarsh, generally drier, sandy areas, normally as scattered clumps rather than as dense stands, also found on sand dunes and cliffs.

Selliera radicans Cav. (Goodeniaceae).

Upper margins of saltmarsh. Very variable in size, widespread but generally present in small quantity, only locally abundant. Also found in wet flushes on cliff tops.

Spergularia sp. (Caryophyllaceae).

A small herb found at the upper margin of saltmarshes, generally in open dry sandy communities. The species in the Sydney region according to Beadle *et al.* (1972) is *S. rubra* (L.) J. et C. Presl. *sensu lato*. In the other southern states *S. media* (L.) C. Presl has been recorded.



Sporobolus virginicus



Suaeda australis



Puccinellia stricta



Wilsonia humilis

Sporobolus virginicus (L.) Kunth (Gramineae).

The most important grass on NSW saltmarshes. Very variable, particularly in leaf length and extent of stolons. Leaves sometimes short (1-2cm) stiff, on upright stems, other specimens have long soft leaves on long stolons. On saltmarshes the taxon represented is var. *minor*, the more robust var. *virginicus* is found on sand dunes and sandy beaches. Found scattered in most saltmarsh communities it may also form extensive almost pure stands which occupy large areas on some sites.

Suaeda australis (R. Br.) Moq. (Chenopodiaceae).

Widespread but on any one marsh tends to occur in small patches which may be found at a variety of levels. In the Sydney region most frequently found on slight ridges in the *Sarcocornia* zone.

Triglochin striata Ruiz et Pav. (Juncaginaceae).

Found throughout the marsh particularly in slight depressions with impeded drainage. In the upper marsh in permanently wet site subject to fresh water flushing the much larger *T. procera* R. Br. may occur.

Wilsonia backhousei R. Br. (Convolvulaceae).

Rather uncommon in the Sydney region, possibly once more frequent but still occurring in the upper part of some saltmarshes on the Parramatta River.

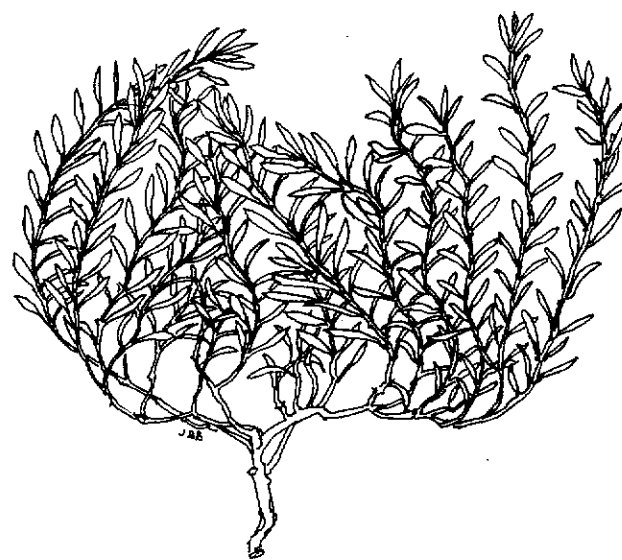
Two other species in the genus, *W. rotundifolia* Hook. and *W. humilis* R. Br., the latter an attractive creeping plant with crowded leaves covered with a silky silvery grey pubescence, are widespread on saltmarshes in the other southern states. Both have been recorded from saline areas in inland western NSW.

Zoysia macrantha Desv. (Gramineae).

Widespread in dry sandy areas at the upper edge of marshes mostly above the normal tidal limit. Spikelets fall whole when ripe leaving the stem.



Triglochin striata



Wilsonia backhousei



Zoysia macrantha

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