COASTAL WETLAND INDICATOR PLANTS

OF MAINE

UNDER CONTRACT WITH THE
STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
AUGUSTA, MAINE

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FORWORD

For the purpose of this work, coastal wetland habitats are defined as all intertidal and subtidal lands including all areas below any identifiable debris line left by tidal action, and coastal dune systems. This work is not, nor is it intended to be, a comprehensive review of the coastal wetlands flora of Maine. It is limited in scope to those plants which are restricted to, and are therefore indicators of, coastal wetland habitats. Many plants which are generally considered typical or characteristic of thse habitats have been excluded because they also occur in non-coastal habitats with sufficient frequency to render them unacceptable as indicator species.

Three species not included in the actual collections are provided with complete descriptions and included in the overall list for the following reasons. Eriocaulon parkeri has not been definitely observed for decades and is not known to survive in the state. Moreover, controversy persists whether it is a distinct species or merely a variant form of the fresh-water Eriocaulon septangulare. However, some authorities consider it sufficiently characteristic to include it here as a coastal wetland indicator.

Neither collection nor citeable record of any collection of Euphorbia polygonifolia could be found for the State of Maine. However, it occurs south of Maine and in Nova Scotia and has been claimed to occur in Maine. Verifiable collections of the plant may be made within the state at some future date. In the meantime, it seems prudent to include it in this treatment.

The situation is analogous for Iva frutescens. I searched three locations at which the plant had been recently reported to me to occur in an attempt to verify its presence. These sites, in addition to many

others I examined, were indeed appropriate habitats, but Iva was universally absent. Nevertheless, some probability of its occurrence dictates that it be included in this work.

The families treated here are presented in order according to their classification in Gray's Manual of Botany 8th Edition by M. L. Fernald, which is also used as the nomenclatural authority. Genera are presented alphabetically within each family, and species alphabetically within genera. Complete scientific names, including varietal designations and specific naming authorities for each indicator are found solely in the List of Species by Family. Only the genus and species are used in the remainder of the text.

For convenience and ease of access, the entire contents are indexed alphabetically, by both scientific and common name. Descriptions are strongly oriented for use by untrained observers although, by necessity, a handful of technical terms are retained. Illustrations are presented for most species and an illustrated glossary aids in defining key diagnostic features. Habitat, growth habit, and ecogeographic notes are tabulated for each species. Following this introductory information is a more detailed description, in a categorized series of diagnostic character descriptions which are cross-referenced to a complete reference series of exemplary specimens available on file at the regional offices of the Maine State Department of Environmental Protection in Augusta, Bangor and Portland, Maine.

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INTRODUCTION

Coastal wetlands include areas ranging from the open coast to the inland limits of tidal action in major estuaries. Consequently, they experience wide variation in a number of environmental factors including wind and wave exposure, tidal amplitude, salinity and substrate. The interaction of these factors forges a more or less continuous range of ecological circumstances in a variety of habitats.

Some of these habitats are reasonably well defined, such as dunes, beaches, salt marshes, and saline tidal flats. Others represent sub-habitats such as the shallow saline or brackish pools (salt-pannes) that occur in salt marshes; transitional habitats such as sea strands which are intermediate between beaches and salt marshes; and unique extremes of more typical coastal habitats, notably brackish tidal marshes and flats.

Despite this diversity of habitats, coastal wetlands are strongly interrelated by a number of basic ecological similarities. Coastal wetland habitats in Maine, although naturally stable over long periods of time, are by no means static environments. They are dynamic, constantly changing communities. Winter weather conditions are a major cause for this, both directly and indirectly.

In dune systems winter storms exert tremendous destructive effects via erosive winds and excessive wave action. These influences are relatively minor in salt marshes, however, ice damage is frequently extensive. As ice freezes during the winter high tides in Maine salt marshes, it binds to persisting dead vegetation from the previous growing season sometimes even deeply as the rhizome mat. When tidal action floats this ice free, it often rips out large areas of the rhizome mat, leaving areas stripped completely of all vegetation. These chunks remain affixed to the ice until spring

thaw when they are deposited randomly in the general locality of their origin. A brief examination of nearly any Maine salt marsh in the early spring will reveal some of these chunks scattered over the marsh and usually the adjacent tidal flats as well. These chunks are disruptive themselves, as they smother any vegetation inhabiting the site on which they eventually come rest.

Other coastal wetlands suffer varying combinations of the effects discussed for dunes and salt marshes. Like the death of an old tree in terrestrial forest communities, these destructive environmental influences in coastal habitats set the stage for new colonization and thereby help to maintain continuing diversity of the flora in coastal ecosystems.

In salt marshes, sea-strands, and beaches, members of the Goosefoot family (glassworts, sea-blites, Salsola and orachs) are very important as early colonizers of disturbed and unvegetated areas. As they germinate and send down their shallow roots they begin the important process of stabilizing the substrate. On beaches and sea-strands, the process rarely progresses much farther than this due to the high, weather induced, seasonal environmental instability. In salt marshes, as these plants grow they help to trap floating debris which breaks down and contributes nutrients to the substrate. At the end of the growing season as these abundant annual plants die back, they themselves contribute to the organic matter in the soil.

Following the early stages of substrate stabilization initiated by the early colonizers, a variety of grasses, sedges and rushes become established. It is at this point that areas first become characterizable salt marshes. Most of these plants possess extensive rhizome systems which become tightly interwoven into a tough stabilizing mat.

The rhizome mat provides matrix in which more shallowly rooted or less tenacious plants can secure a hold and become established, pumps other-

wise inaccessable nutrients from deeper sediments to where they can be utilized by other species, retard moisture loss, and traps dead plant and animal material thereby facilitating the addition of organic material to sterile substrates. In a real sense, these plants define salt-marsh and dune ecosystems; without their tightly woven rhizome mats it is doubtful that many of the plants generally considered typical of these communities would be able to become established or persist.

Once coastal ecosystems have attained this level of stability a third type of plants typically becomes established: those with deep, woody, often carrot-like roots. These plants, including Arrow grass, seaside plantain, seaside goldenrod and a number of others, are found abundantly for the most part in ecologically mature communities. They are not commonly found in areas that have been recently disturbed or recolonized.

Dunes depart from this general model in that they "skip" the initial colonization stage by members of the Goosefoot family. Most members of the Goosefoot family are very succulent and require continual high levels of moisture. Despite their proximity to limitless quantities of water, the surface layers of dunes are extremely dry (not to mention hot)--insufficient for most "typical early colonizers". Initial colonization on dunes is usually accomplished by very deep-rooted Beach grass, which in combination with a species of sedge, assumes an ecological role comparable to that of grasses, sedges, and rushes in marsh habitats.

Tidal flats represent a situation in contrast to all other wetland habitats. Mudflats are very homogeneous in regard to both substrate and the environmental conditions which they experience. However, their constantly repeated submersion and emersion as a result of tidal action renders them stressful environments which require special adaptations for

survival. As a result of this homogeneity and severity, it is not surprising that tidal flats are inhabited by so few, but absolutely characteristic species.

Indicator species rarely occur individually. They occur in usually characteristic assemblages and this is the perspective in which they should be considered. Each general habitat type possesses one or more unique indicators. However, many indicators species occur in several habitat types. Thus, the distinction between specific habitat types is not always clear cut, and imposition of a particular habitat classification on a given area is generally inadvisable. Further partitioning of a habitat type into arbitrary artificial subdivisions (such as upper marsh, transition marsh, and lower marsh within salt marshes) is not only essentially useless but also of marginal validity. Alternatively, it is an excellent practice to make as detailed observations as possible regarding the environmental conditions in which a particular species is growing. The combination of a carefully identified assemblage of indicator species with good ecological observations should leave no doubt as to the classification of a given site as a coastal wetland.

LIST OF SPECIES BY FAMILY

Zosteraceae

Ruppia maritima L.

Zostera marina L. var. *stenophylla* Aschers. & Graebn.

Juncaginaceae

Triglochin maritima L.

Alismaceae

Lophotocarpus spongiosus (Engelm.) J. G. Sm.

Poaceae

Ammophila breviligulata Fern.

Distichlis spicata (L.) Greene

Elymus arenarius L. var. *villosus* Mey.

Puccinellia maritima (Huds.) Parl.

Puccinellia paupercula (Holm.) Fern. & Weath. var. *alaskana* (Scribn. & Merr.) Fern. & Weath.

Spartina alterniflora Loisel

Spartina patens (Ait.) Muhl.

Cyperaceae

Carex mackenziei Krecz.

Carex paleacea Wahlenb.

Carex silicea Olney.

Eleocharis halophila Fern. & Brack.

Scirpus maritimus L. var. *Fernaldi* (Bickn.) Beetle

Scirpus paludosus Nels. var. *atlanticus* Fern.

Eriocaulaceae

Eriocaulon parkeri Robins.

List of Species by Family Cont.

Juncaceae

Juncus gerardi Loisel.

Chenopodiaceae

Atriplex glabriuscula Edmondston

Atriplex patula L. var. *littoralis* (L.) Gray

Salicornia bigelovii Torr.

Salicornia europaea L.

Salsola kali L.

Sueda americana (Pers.) Fern.

Sueda linearis (Ell.) Moq.

Sueda maritima (L.) Dumort.

Sueda richii Fern.

Amaranthaceae

Acnida cannabina L.

Caryophyllaceae

Arenaria peploides L. var. *robusta* Fern.

Spergularia marina (L.) Griseb.

Brassicaceae

Cakile edentula (Bigel.) Hook

Rosaceae

Potentilla anserina L.

Rosa rugosa Thunb.

Euphorbiaceae

Euphorbia polygonifolia L.

Fabaceae

Lathyrus japonicus Willd.

List of Species by Family Cont.

Cistaceae

Hudsonia tomentosa Nutt.

Lechea maritima Leggett

Apiaceae

Ligusticum Scothium L.

Primulaceae

Glaux maritima L.

Samolus parviflorus Raf.

Plumbaginaceae

Limonium nashii Small

Boraginaceae

Mertensia maritima (L.) S. F. Gray

Scrophulariaceae

Gerardia maritima Raf.

Plantaginaceae

Plantago juncoides Lam.

Asteraceae

Artemisia stelleriana Bess.

Aster novi-belgii L. var. *litoreus* Gray

Iva frutescens L. var. *oraria* (Bartlett) Fern. & Grisc.

Solidago sempervirens L.

Xanthium echinatum Murr.

HABITAT DISTRIBUTION OF MAINE COASTAL WETLANDS INDICATORS

ALPHABETICAL LIST OF SPECIES	Dunes	Beaches	Sea Strands	Saline Tidal Marshes	Salt Pannes	Saline Tidal Flats	Brackish Tidal Marshes	Brackish Tidal Flats
Acnida cannabina				X			X	
Ammophila breviligulata	X							
Arenaria peploides		X	X					
Artemesia stellariana	X							
Atriplex glabriuscula		X	X					
Atriplex patula		X	X	X				
Aster novi-belgii				X			X	
Cakile edentula		X	X					
Carex mackenziei				X				
Carex paleacea				X				
Carex silicea	X							
Distichlis spicata				X				
Eleocharis halophila				X				
Elymus arenarius	X	X	X					
Eriocaulon parkeri								X
Euphorbia polygonifolia	X	X						
Gerardia maritima				X				
Glaux maritima				X				
Hudsonia tomentosa	X							
Iva frutescens				X				
Juncus gerardii				X				
Lathyrus japonicus		X	X					
Lechea maritima	X							
Ligusticum scothicum		X	X	X				
Limonium nashii				X				
Lophotocarpus spongiosus								X

HABITAT DISTRIBUTION OF MAINE COASTAL WETLANDS INDICATORS

ALPHABETICAL LIST OF SPECIES	Dunes	Beaches	Sea Strands	Saline Tidal Marshes	Salt Pannes	Saline Tidal Flats	Brackish Tidal Marshes	Brackish Tidal Flats
Mertensia maritima		X	X					
Plantago juncoides				X				
Potentilla anserina		X	X	X				
Puccinellia maritima				X				
Puccinellia paupercula		X	X	X				
Rosa rugosa	X							
Ruppia maritima					X	X		X
Salicornia bigelovii				X				
Salicornia europaea				X				
Salsola kali		X	X					
Samolus parviflorus				X			X	
Scirpus maritimus				X				
Scirpus paludosus				X				
Solidago sempervirens				X				
Spartina alterniflora				X				
Spartina patens				X				
Spergularia marina				X				
Sueda americana				X				
Sueda linearis				X				
Sueda maritima				X				
Sueda richii				X				
Triglochin maritima				X				
Xanthium echinatum	X	X		X				
Zostera marina						X		

KEY TO CHARACTER CROSS REFERENCING OF MOUNTED SPECIMENS

Au.....auricle

Cl.....clasping-leaved

Co.....collar

H.....head

I.....inflorescence

If.....female inflorescence

Im.....male inflorescence

L.....leaf

La.....leaf axil

Lft.....leaflet

Li.....ligule

Linv.....involucral leaf

Ls.....leaf sheath

Pt.....petal

R.....root

Rh.....rhizome

S.....stem

Sn.....stolon

Sp.....sepal

St.....stipule

Te.....tendril

DESCRIPTION OF SPECIES

Ruppia maritima — Ditch-grass, widgeon grass

GROWTH HABIT: An annual, submersed, aquatic plant with numberous thread-like leaves.

HABITAT: Submersed in quiet saline and brackish backwaters, salt-pannes in salt marshes, and water-filled depressions on brackish mudflats.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Requires continual submersion for survival, forms dense lush patches in salt-pannes, tends to be sparsely distributed in other habitats. Flowering in late June and July, fruits maturing late July-September.

ROOTS: Essentially none, the lower portion of the stem may be partially buried in the muddy substrate.

STEMS: Thread-like, alternately forking, profusely branched.

LEAVES: Alternate, threadlike, 2-10 cm long, with transparent basal sheaths, the sheaths 0.2-12 mm long.

FLOWERS: Inconspicuous.

FRUITS: Usually occurring in clusters of four, individually long-stemmed, obliguely ovoid, pointed, 1.5-3 mm long, brownish-gray at maturity.

Zostera marina — Eelgrass

GROWTH HABIT: A submersed, perennial, aquatic, herb, grass-like with extensive rhizomes.

HABITAT: Saline waters over muddy (occasionally sandy) substrates, occasional in water-filled depressions on saline tidal flats.

Zostera marina Cont.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Probably the most important plant, from an ecological standpoint, of subtidal habitats in our geograhic range. In addition to providing shelter and being an important component of food chains for hundreds of marine organisms it contributes significantly to the nutrient content of surrounding waters upon decomposition. It reaches its greatest development during the summer, however, plants can be observed the year round in most areas.

RHIZOMES: Extensive, simple to profusely branching up to 5 mm in diameter, covered by a thin chestnut-brown skin.

STEMS: Simple or sparingly branched, if branched the joints obscured by the surrounding leaf sheaths, stems sometimes several meters in length depending partly on the depth of the water.

LEAVES: Alternate grass-like, flat, sheathing the stem at the base, with parallel margins (not tapering) up to 1 m in length, 5-7 major longitudinal veins (and numerous lesser ones), the tips either bluntly rounded or shallowly notched.

FLOWERS: Unisexual, inconspicuous, green, arranged in a pair of alternating rows (appearing as if braided) enclosed in the long transparent leaf sheaths.

SEEDS: Barrel shaped, 3-4 mm long, arranged like the flowers, ripening from July to October.

Triglochin maritima — Arrow-grass

*CAUTION: This plant may be carelessly confused with Plantago juncoides. Careful examination of the plants will avert this error.

GROWTH HABIT: A small to moderate plant with very long, slender, mostly basal, sheathing leaves, a deep perennial rootstock, and inconspicuous green flowers on an erect spike.

HABITAT: From slightly below up to MHW in saline and occasionally brackish marshes.

ECONOTES: See caution, the only poisonous inhabitant of salt marshes.

ROOTS: Deep, perennial, woody, the summit of the root emerging from the substrate, this emergent portion densely covered by white to straw-colored scales made up of the persistent dead remains of the previous year's leaf bases.

STEMS: Erect, unbranched, very tough, fibrous. The upper portion bearing the flowers and fruits, essentially leafless but the sheathing bases of the leaves sometimes giving the lower portion of the stem the appearance of bearing leaves.

LEAVES: Basal, in a rosette, long (occasionally over 50 cm), very narrow, tubular, hollow (similar to chive leaves), gray-lime-green, the bases of the leaves clasping the stem.

FLOWERS/FRUITS: Arising on very short individual stems branching from the main stem, the flowers made up of small green scales, the fruits narrow egg-shaped with 6 strong longitudinal ribs and a sharp 6-pointed crown at the tip of the fruit.

Lophotocarpus spongiosus

GROWTH HABIT: Upright, with thick but narrow, spongy basal leaves and a leafless stem bearing globelike clusters of seeds, a

Lophotocarpus spongiosus Cont.

shallowly rooted annual herb.

HABITAT: Brackish tidal mudflats.

OCCURRENCE: Extremely rare, although occasionally abundant in a given locality; probably coastwide at one time but apparently restricted to a handful of localities in the central and southerly regions of the coast at present.

ECONOTES: A very vulnerable species, sensitive to ice damage, other disruptions, and pollution. In the event of locating specimens, the State Planning Office, Critical Areas Program, should be informed.

ROOTS: Stringy, shallow, 1-1.5 mm in diameter, whitish-gray with numerous regularly spaced cross partitions.

STEMS: Leafless, essentially unbranched except at the summit where it may produce 1-4 whorls of 1-3 branches on which the flowers are borne.

LEAVES: Strictly basal, in an open rosette, essentially bladeless, the petiole very thick and spongy, up to 30 cm in height. 0.8-1.2 cm broad, with 3 green sepals and 3 white petals which fall off early in the season.

SEEDS: 2.6-3 mm long, wedge-shaped with a sharp-pointed horizontal beak at the apex, arranged in a tight globose head approximately 1 cm across.

GRASSES, SEDGES AND RUSHES (Pooceae, Cyperaceae, Juncaceae)

*CAUTION: These families comprise what is probably the most confusing and difficult to identify assemblage of coastal wetland indicator plants. Their classification and systematics are extremely technical and complex. However, enough basic differences usually exist to provide clear separation of species after a careful examination, often on the basis of vegetative characters. A general field key to indicator species based on vegetative and ecological characteristics follows. More so than with other groups of plants, supportive information from floral and fruit characters is desirable for verification of preliminary identifications. The vegetative key offered here should not be relied upon as a final authority.

GENERAL FIELD KEY TO GRASS-LIKE COASTAL WETLAND INDICATOR SPECIES

1. Stems triangular in cross section.....2
1. Stems round in cross section.....6
2. Ligule present (*Carex*).....3
2. Ligule lacking (*Scirpus*).....5
3. Plants of Dunes.....*Carex silicea*
3. Plants of Salt Marshes.....4
4. Frail plants, less than 30 cm.....*Carex mackenziei*
4. Robust plants, 50-150 cm.....*Carex paleacea*
5. Leaf sheaths uniformly veined as in the leaves.*Scirpus maritimus*
5. Front face of leaf sheaths membranaceous, delicately veined.....
.....*Scirpus paludosus*
6. Stems without nodes or leaves.....*Eleocharis halophila*
6. Nodes and leaves present.....7
7. Pith solid.....*Juncus gerardii*
7. Pith hollow.....8
8. Grasses of Dunes, beaches, and seastrands.....9
8. Grasses of salt marshes.....11
9. Plants in small tufts, rarely up to 30 cm high,
inhabitants of sea strands and beaches.....
.....*Puccinellia paupercula*
9. Large coarse plants (often over 1 m).....10
10. Leaves broad and flat, mainly an inhabitant of
beaches.....*Elymus arenarius*
10. Leaves narrow and involute, mainly an inhabitant
of dunes.....*Ammophila breviligulata*
11. Leaves strongly two-ranked.....*Distichlis spicata*
11. Leaves not strongly two-ranked.....12

12. Ligule white, papery-waxy.....*Puccinellia maritima*

12. Ligule whitish, topped by a dense fringe of hairs. (*Spartina*).....13

13. Leaves narrow, involute.....*Spartina patens*

13. Leaves broad, flat (occasionally involute).....
.....*Spartina alterniflora*

Ammophila breviligulata — Dune Grass

GROWTH HABIT: A large, robust, wiry, deep-rooted, perennial grass.

HABITAT: Dunes.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: An absolutely critical species for the natural maintenance of coastal dune systems. Probably the single most important species due to the strong erosion resistant substrate-binding capacity of its deep spreading roots.

RHIZOMES: Extremely deep, woody, extensively branching and laterally creeping, covered with a thick shaggy brown skin.

STEMS: Stiffly erect, up to 1 m high, with a shiny finish.

LEAVES: Long, stiff, often bent backwards, very narrow, almost invariably tightly involute.

INFLORESCENCE/FLOWERS/FRUITS: A stiff, dense, constricted spike, made up of thousands of tightly overlapping flower/fruit bearing scales, generally cylindrical but tapering gradually towards both ends, white to sometimes pinkish or purplish, 10-40 cm in length, usually about 1/10 as broad as long.

Distichlis spicata — Spike-Grass

GROWTH HABIT: A robust, moderate sized, perennial grass with extensive well developed rhizomes, the sexes on separate plants.

HABITAT: At and just above MHW in salt marshes.

OCCURRENCE: Common and abundant; mostly in the southern region of the coast.

Distichlis spicata Cont.

ECONOTES: Often occurring in a lush dense belt along the upland borders of our more southerly salt marshes, it frequently abutts Spartina patens on the down-tide border of these belts. Its tough ropy rhizomes comprise the dominant component of the rhizome mat in this region.

RHIZOMES: Tough, thick (3-6 mm), white, ropy, extensively branching and spreading laterally, interweaving to form an extremely dense tough mat 5-10 cm below the soil surface, covered by overlapping papery scales, see econotes.

STEMS: Erect, fairly stout, 10 cm to over a meter in height, typically unbranched.

LEAVES: Alternate, distinctly 2-ranked, 5-15 cm long, usually involute, generally a light gray-green.

INFLORESCENCE: A tight cylindrical cluster made up of many flattened heads, the heads comprised of alternating ranks of small tightly overlapping boat-shaped pairs of scales the flowers and fruits enclosed within these pairs of scales. Heads on female plants generally larger and more robust in comparison to male plants in the same population.

Elymus arenarius Strandwheat

GROWTH HABIT: A large, robust, coarse perennial grass.

HABITAT: Primarily just above MHW extending up to the limits of equinox tides on sand or gravel beaches and loose substrates. Occasional on dunes.

Elymus arenarius Cont.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Forms very tough, wiry, extensive rhizome systems, thereby archoring otherwise unstable substrates. The stiff flowering stems and dead leaves persist through winter and are identiable throughout most of the winter.

RHIZOMES: Extensive, stout, branching, creeping laterally.

LEAVES: Alternate, coarse, very firm, very wide (up to 1.5 cm), sometimes involute, up to 75 cm in length.

STEMS: Very stout, coarse, up to 1.5 m high.

FLOWERS/FRUITS: Arranged in stiff, dense, constricted spike up to 30 cm long and usually about a tenth of its length in diameter, occurring at the apex of the stem. Spike constructed of ascending sets of paired scales, often giving the head a rectangular appearance.

Puccinellia maritima — Goosegrass

*CAUTION: Very difficult to distinguish superficially from P. paupercula. The only clear-cut distinguishing characters are the length of the anthers during flowering and the length of the mature grain. A number of slight "differences of degree" are manifested in other morphological characters and apparent habitat preference. These species are undoubtedly often confused with one another. Fortunately, both are indicators.

GROWTH HABIT: A small to moderate perennial grass.

HABITAT: Slightly below to more often at or just above MHW, mostly in salt marshes, occasional in other saline habitats.

Puccinellia maritima Cont.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: See *Caution. A frequent early colonizer of disturbed areas where it tends to occur in isolated tufts. Similarly distributed or patchy throughout undisturbed areas of the marsh. Mostly flowering very early (May-June) and maturing and shedding its grains by the end of July, the stems persistent throughout the growing season but usually drying and turning brown in July.

ROOTS: Shallow, fibrous, whitish, sometimes developing a diminutive stolon late in the growing season.

STEMS: Often in dense clumps, erect or leaning but stiff, 15 cm to 1 m high, terminating in a branched flower cluster (inflorescence), 5-30 cm long, the branches straight, diverging at various angles from the main axis.

LEAVES: Alternate, firm, usually involute late in the growing season, 4-20 cm long, with a white-waxy ligule in the axils.

FLOWERS/FRUITS: Flowers and fruits enclosed in a complex array of overlapping papery scales at the tips of the inflorescence branches, anthers 1.4-2.1 mm long, grain 2-2.2 mm long.

Puccinellia paupercula Goosegrass

*CAUTION: See *Caution for P. maritima.

GROWTH HABIT: A small, usually tufted, perennial grass.

HABITAT: Just below and up to (occasionally above) MHW, predominantly on sea strands and coarse beaches, less frequent on salt marshes.

Puccinellia paupercula Cont.

OCCURRENCE: Frequent and sometimes abundant; coastwide.

ECONOTES: See *caution. Most often growing in small separated tufts just below MHW, flowering early and continuing to flower and fruit throughout the growing season, also remaining green and healthy in appearance for that duration.

ROOTS: As in P. maritima.

STEMS: In dense clumps, 5-45 cm high, usually appearing to be stunted. Inflorescence as in P. maritima but proportionally smaller.

LEAVES: Alternate, soft, usually flat, up to 12 cm long, with a white papery ligule in the axils.

FLOWERS/FRUITS: As in P. maritima but anthers 0.5-1 mm long, grain 1.7-2.0 mm long.

Spartima alterniflora Salt-water Cord Grass

GROWTH HABIT: A robust, extensively rhizomatous, perennial grass.

HABITAT: Usually below MHW, occasionally up to MHW, mostly in salt marshes.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Probably the single most commonly recognized and certainly one of the most characteristic indicators of salt marshes. S. alterniflora will inhabit disturbed or uncolonized areas up to MHW but most typically and abundantly it lushly inhabits a fairly broad belt on the seaward borders of salt marshes.

RHIZOMES: Extensive, white, branching and loosely interlaced, covered with delicate papery scales, flaccid to delicate-spongy.

Spartina alterniflora Cont.

STEMS: Stiffly erect, stout, robust, very thick at the base, from 20 cm to over 2 m in height, producing a conspicuous sweet grassy odor when bruised.

LEAVES: Alternate, flat (becoming involute if dried), wide (0.5-1.5 cm), usually quite long, sometimes over 75 cm, very smooth to the touch, the surface sometimes appearing shiny, angular salt crystals often visible on the leaf surface.

INFLORESCENCE: Not very conspicuous, many branched but the branches diverging at such an acute angle that the head is strongly constricted laterally. The individual branches each bearing a pair of adjacent rows of small narrow scaly heads. The individual heads bearing the fruits and flowers.

Spartina patens — Salt-Meadow Grass

*CAUTION: This species is sometimes carelessly confused with Distichlis spicata. However, its texture, color, inflorescence, and rhizomes are distinctly different. Careful examination will avert any problem of confusing the two.

GROWTH HABIT: A small to moderate, erect, wiry perennial grass.

HABITAT: From just below up to MHW almost exclusively in salt marshes.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Along with S. alterniflora, this species to a large extent defines the biotic communities which we commonly label salt marshes. The tough wiry extensive rhizomes of S. patens are critically important in maintaining the long-term stability of coastal marshes.

Spartina patens Cont.

RHIZOMES: Extensive, thin (1.5-3 mm), tough, wiry usually dark gray in color.

STEMS: Stiffly erect, wiry, 15-75 cm in height, young plants bright green, becoming dusky later in the season and usually turning maroon near the base of the plant. The stems remaining even after being killed back to the rhizomes by frost, the new plants penetrating this mat of dead stems the following spring.

LEAVES: Alternate, stiff, very narrow, almost invariably involute, usually 3-5 leaves on a given plant, the leaves often 2-ranked to some degree but rarely strongly so, the leaves usually diverging stiffly from the stem at a substantial angle but less than 90°, leaves with fine but deep longitudinal channels in the upper surface.

INFLORESCENCE: One to four short branched spikes arising from near the tip of the unbranched stem, each spike made up of a pair of closely adjacent rows, the rows comprised of a series of closely overlapping scales, flowers and fruits contained within the scales, the spikes often gray-purple to a rich purple-brown in color.

Carex Sedge

*CAUTION: Carex is an immense almost incomprehensibly complex genus of worldwide distribution with representatives in almost every conceivable type of habitat. In Maine alone, over 150 species occur. The three indicator species included

Carex Cont.

here are fortunately well defined and distinct from any close upland relatives that are likely to be found in adjacent areas. However, similar species do occur in inland habitats. Where any question exists over final identification it is prudent to consult an expert.

Carex mackenziei — Sedge

GROWTH HABIT: A small, frail, often drooping, perennial sedge; grassy in general appearance.

HABITAT: At and just above MHW in well-developed mature salt marshes.

OCCURRENCE: Rare but occasionally abundant in a given locality; coastwide.

ECONOTES: Flowering very early (May-June), also dying back early usually having disappeared by mid-July. Rhizome system minimally developed, spreading very slowly.

RHIZOMES: Poorly developed, shallow.

STEMS: 10-40 cm in height, smooth, soft, delicate (almost thread-like).

LEAVES: 7-30 cm long, soft, flat, narrow (1-2.5 mm broad), sheath closed, veinless, membranaceous, ligule well developed.

INFLORESCENCE: Made up of 2-6 small (0.5-1.2 cm) heads, the top most head with male (staminate) flowers at the base, the remainder of the head and other heads comprised of female (pistillate) flowers.

FLOWERS/FRUITS: Enclosed in a sac-like structure (perigynium), perigynium ovid, 2-5-3.3 mm long, 1.6-2 mm broad, closely covered by broad reddish-brown scales. Seed flattened-egg-shaped,

Carex mackenziei Cont.

shiny, often with the remains of the stigma persisting as a dark-brown beak.

Carex paleacea — Sedge

GROWTH HABIT: A large, lushly developed perennial sedge. Grasslike in general appearance.

HABITAT: Just above MHW in salt marshes.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Most often growing in very dense stands adjacent to the upland borders of salt marshes.

RHIZOMES: Extensive, white, ropy, and scaly, tightly interwoven into a tough mat up to 10 cm deep in the substrate.

STEMS: Flowering stems 0.1-1.5 m in height, overtopped by the sterile leafy stems 0.2-1.7 m, sharply 3-angled, arising directly from the rhizomes.

LEAVES: 3.5-12.0 mm broad, flat, smooth, strongly ribbed, sheath closed, the face opposite the blade veinless and membranaceous, ligule well developed.

INFLORESCENCE: Of 2 types (male and female) on each plant, both pendant on long slender stems. Female (pistillate) spikes 2-6, scattered, 2-8 cm long, 0.8-2 cm thick, the scales straw colored and extending beyond the fruits (and flowers). Male (staminate) spikes 2-4, situated above the female spikes, 2-4 cm long, 3-6 mm thick.

FLOWERS/FRUITS: Enclosed in an inflated sac (perigynium), perigynium round-elliptical, usually flattened on one side, with

Carex paleacea Cont.

very fine veins running lengthwise. The seed usually eliptical, with an evident beak, usually with an obvious crease in one side.

Carex silicea

GROWTH HABIT: A wiry, perennial sedge growing in scattered tufts or clumps; grasslike in general appearance.

HABITAT: Dunes.

OCCURRENCE: Common and frequently abundant; coastwide.

ECONOTES: Although C. silicea produces and spreads by means of rhizomes, the most developed underground portion of the plant is the extremely deep vertical primary root. Additional anchorage, nutrition, and moisture are provided through thousands of hair-like secondary roots. The primary root persists year after year and generates a new "plant" each spring.

ROOTS: Deep well-developed primary root with many thread-like secondary roots.

STEMS: Slender, wiry, 15-80 cm high, often arching, triangular in x-sec. but not sharply so.

LEAVES: Fairly stiff, narrow (2-4.5 mm), often involute, bases of blades with a pair of rounded auricles. Sheaths long, uniformly veined like the leaves, ligule well developed.

INFLORESCENCE: Comprised of 3-9 elipsoid to egg-shaped heads (0.6-1.4 cm) long, distributed over the upper 2.5-10 cm of the stem.

Carex silicea Cont.

FRUITS/FLOWERS: Enclosed in a strongly flattened sac (perigynium), the perigynium firm and opaque, with evident longitudinal veins.

Eleocharis halophila

GROWTH HABIT: A low, wiry, erect, leafless, perennial sedge; appearing as a delicate, upright, naked stem topped by a tiny narrowly egg-shaped head.

HABITAT: At MHW in well developed salt-marshes.

OCCURRENCE: Rare but occasionally abundant in a given locality; coastwide.

ECONOTES: Producing wiry, shallow, extensively spreading rhizomes; an important shallow component of the rhizome mat of salt-marshes a small plant which is easily, and probably often, overlooked.

STEMS: Simple, erect, stiffish, very slender, becoming maroon toward the base 3-60 cm high.

LEAVES: Leafless, but with a short closed sheath surrounding the base of each stem.

RHIZOMES: Slender, but very strong, wiry, extensively spreading, dark colored, with plants arising at intervals.

INFLORESCENCE: A narrowly elliptical head, 0.3-1.7 cm long, 2-6 mm thick, of tightly overlapping scales, the lowermost scale forming a complete collar around the top of the stem. Scales reddish-brown with transparent margins, lustrous, 3-5 mm long.

FRUITS (SEEDS): Hard, shiny, borne behind each scale of the inflorescence, egg-shaped to slightly pear-shaped, yellowish to dark brown

Eleocharis halophila Cont.

or olive, 1.2-1.8 mm long by 1-1.4 mm broad, topped by a "hatlike" tubercle, tubercle bulbous, tapering to a conical summit, higher than broad, 0.2-0.5 mm broad at base.

Scirpus — Salt-Marsh Bulrush

*CAUTION: Both S. maritimus and S. paludosus are members of a large taxonomically confused complex of species (section Phyllantheli) that is badly in need of revision. No two of the botanical manuals in general widespread usage agree entirely on even the names let alone the technical descriptions of the two species. Varietal distinctions, although important, are even more nebulous.

Scirpus maritimus — Bulrush

GROWTH HABIT: A robust, coarse, upright, perennial sedge; grass-like in appearance.

HABITAT: Slightly above to slightly below MHW in the wetter portions of salt marshes, often in shallow salt pannes, rarely on protected sea-strands.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: S. maritimus forms extensive, branched, loosely interwoven rhizome systems. At intervals along these rhizome systems starchy tubers develop. During the following spring these tubers develop into new plants (which retain this tuber as a bulbous base throughout the growing season). This plant reaches its greatest stature in very wet spots, particularly

Scirpus maritimus Cont.

in shallow salt pannes. They tend to be stunted and fruit poorly in drier portions of salt marshes.

STEMS: 0.2-1.5 m in height, a 5-1.5 cm thick at base, sharply 3-angled, the sides collapsing slightly to make the sharp-ridge edges stand out.

LEAVES: Alternate, dark green with a pronounced midrib, 3-5 mm broad, sheaths closed, veined much as the leaf blades, 2-4 leaves at the base of the inflorescence, the longest (15-25 cm) sometimes appearing as an extension of the stem or as foliage leaves.

RHIZOMES: As discussed in Econotes.

INFLORESCENCE: Made up of one to many narrowly elliptical (1-4 cm x 3-8 mm) spikelets of tightly spirally overlapping tan-brown scales. Spikelets either stemless and borne in a tight cluster at the summit of the stem or terminating long individual stems radiating from a point at the summit of the stem.

FRUIT: (Seeds) Borne individually behind each scale, upside-down egg-shaped with a short blunt tip, flatly triangular in cross-section, 2.8-5 mm long, 2-3.5 mm broad, very dark brown, shiny.

Scirpus paludosus — Bayonet-grass

*CAUTION: See *caution for S. maritimus.

GROWTH HABIT: As in S. maritimus.

HABITAT: As in S. maritimus.

Scirpus paludosus Cont.

OCCURRENCE: As in S. maritimus.

ECONOTES: As in S. maritimus.

STEMS: 15 cm-1.5 m in height, 2-8 mm thick at base, 3-angled but not as sharply as S. maritimus.

LEAVES: As above, but usually light green, 2-12 mm broad, leaf sheaths closed, membranaceous, with 9-12 delicate vertical veins near the summit. 2-5 involucral leaves at the base of the inflorescence, the longest (5-15 cm) appearing as a continuation of the stem, the others diminutive.

RHIZOMES: As in S. maritimus.

INFLORESCENCE: As in S. maritimus, but the spikelets, pointed-egg-shaped, 1-2 cm long, 4-8 mm broad, dark reddish brown sometimes approaching black.

FRUIT: (Seeds) Generally as in S. maritimus, but more or less spade shaped in outline with a short blunt tip at the flattened top, shallow semi-circular (plano-convex) in cross-section, 2.8-4 mm long, 2-3.5 mm broad, olive-dark-brown, shiny.

Eriocaulon parkeri Pipewort

GROWTH HABIT: A small plant with a basal rosette of narrow tapered leaves and a single delicate vertical stem topped by a tight button-like head of tiny inconspicuous flowers.

HABIT: Brackish tidal flats.

OCCURRENCE: Extremely rare, very possibly no longer existent within the state.

ECONOTES: Apparently very sensitive to pollution and disturbance.

Eriocaulon parkeri Cont.

ROOTS: Shallow, threadlike, with numerous conspicuous cross partitions.

STEMS: Erect, unbranched, frail.

LEAVES: Strictly basal, awl-shaped, 1-5 cm long.

FLOWERS/FRUITS: Tiny, inconspicuous, interspersed with tiny scales, aggregated into a small button-like head 2-7 mm broad, tawny in color.

Juncus gerardii Black Grass

GROWTH HABIT: A stiffly erect, wiry, perennial rush. Grassy in general appearance.

HABITAT: At and just above MHW in salt marshes.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Produces very tough, but shallow wiry rhizome systems. An important component of the stabilizing rhizome mat in salt marsh communities. Black grass is most often observed in a dense well defined band towards the upland limit of salt marshes. From a distance, the dark brown seed capsules lend a dark colored appearance to patches of the plant and hence, the name Black Grass.

RHIZOMES: Dark colored, horizontal, wiry, shallow and spreading.

STEMS: Erect 15-80 cm in height, arising at frequent intervals from the rhizome.

LEAVES: Alternate sheaths open, topped by an evident collar of accessory tissue (auricle) and continuing into a flat very narrow leaf. A single involucral leaf occurs at the base of the inflorescence, appearing as a continuation of the stem.

Juncus gerardii Cont.

INFLORESCENCE: Branched but not spreading, 0.1-10 cm in length, usually longer than the involucral leaf.

FLOWERS: 2.0-3.5 mm in diameter, individually on very short stems (or stemless), 3 papery chestnut colored sepals and 3 similar petals.

FRUIT: Dark reddish-brown, football shaped from the side and roundly triangular in end view, 2.0-3.5 mm in length, seeds minute and of similar coloring.

Atriplex glabriuscula — Sea-beach Orach

GROWTH HABIT: Variable; simple to heavily branched, upright or sprawling stout, usually lush in appearance, very succulent, fleshy, shallow rooted, annual.

HABITAT: Just above MHW on beaches and sea strands.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: A. glabriuscula is, in a sense, a 'border' species. It most abundantly inhabits the interface region between the areas of daily tidal influence and those areas which are typically exposed only to equinox or storm tides. In this area it may sometimes be observed as a belt of lush vegetation. On sandy beaches it is more likely to be scattered intermittantly.

ROOTS: Simple and shallow.

STEMS: As discussed in growth habit, often irregularly ribbed, the ribs frequently red-purplish, the lower and primary branches nearly opposite one another, the upper branches alternate.

Atriplex glabriuscula Cont.

LEAVES: Alternate, very thick and fleshy, triangular to egg-shaped, up to 8 cm in length, most often covered with a white waxy mealy coating (glaucous bloom).

FLOWERS/FRUITS: Scattered in a small cluster in the axils of leaves at the tips of the branches, tiny, the individual flowers each enclosed by a pair of fleshy egg-shaped to triangular bracts (5-12 mm long), the margins of the bracts sometimes united (fused) from the base to below the middle, each flower producing a single seed 2-5 mm broad.

Atriplex patula — Orach, Goosefoot

*CAUTION: A. patula is arbitrarily divided into a number of variable overlapping varieties only one of which, var. littoralis, is considered to be restricted to coastal habitats. The problem is compounded by circular reasoning: one of the characteristics that defines A. patula var. littoralis is its occurrence in saline habitats. It is virtually impossible, or the basis of technical characteristics, to distinguish var. littoralis from the upland terrestrial varieties of the species. Moreover, A. patula is very similar in appearance to the non-indicator genius, Chenopodium, from which it can be clearly distinguished only by means of floral and fruit characters. Summarily, the use of A. patula as an indicator species should be avoided whenever possible.

GROWTH HABIT: As with A. glabriuscula but generally less lush in appearance.

HABITAT: From the upper limits of equinox tides to just below MHW,

Atriplex patula Cont.

mostly in salt marshes.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: See *caution. Occasionally mixed with A. glabriuscula on beaches or sea strands.

ROOTS: As in A. glabriuscula.

STEMS: As in A. glabriuscula but less evidently ribbed, up to 1-5m.

LEAVES: Alternate, fleshy but not nearly so as A. glabriuscula, narrow to slightly triangular or egg-shaped, often with evident teeth on the leaf margins.

FLOWERS/FRUITS: As in A. glabriuscula but much less fleshy, the bracts 1-5 mm long, seeds 1-2 mm broad.

Salicornia bigelovii Dwarf Saltwort

GROWTH HABIT: A small, succulent, sparingly branched, jointed, shallowly rooted annual, often reddish in color.

HABITAT: At and just above MHW in salt marshes.

OCCURRENCE: Rarely observed but sometimes frequent in a given locality; apparently restricted to the southern region of the coast.

ECONOTES: Occasional individuals tend to be scattered throughout a marsh environment. Relatively dense stands may be observed at sites where some severe disruption (i.e. ice damage) has occurred and produced open "colonizable" areas. In such areas it can become abundant in one or two seasons.

ROOTS: Simple and shallow.

Salicornia bigelovii Cont.

STEMS: Usually simple or sometimes sparingly branched, erect, rarely up to 30 cm high and commonly less than 10 cm, clearly jointed, the individual joints 4-6 mm thick, the JOINTS THICKER THAN LONG, a pair of small opposite scales occurring at the top of each joint, the scales with sharp outward pointing tips.

FLOWERS/FRUITS: Minute, hidden in the axils of the scales on the upper third of the plant.

Salicornia europaea — Glasswort, Samphire

GROWTH HABIT: Generally like S. bigelovii but larger and more branched.

HABITAT: As in S. bigelovii.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: As in S. bigelovii.

ROOTS: As in S. bigelovii.

STEMS: Similar to S.bigelovii, but usually branched, erect, leaning or prostrate, up to 40 cm high, often more than 20 cm, the individual joints 1.5-3 (occasionally up to 5) mm thick, the JOINTS LONGER THAN THICK, the scales blunt and flush with the axis of the plant, not outward pointing.

FLOWERS/FRUITS: As in S. bigelovii.

Salsola kali — Saltwort, Barilla-plant, Russian thistle

GROWTH HABIT: A prickly, much branched, shallowly rooted annual.

HABITAT: Just above MHW on beaches.

OCCURRENCE: Common; coastwide but most frequent in the southern range

Salsola kali Cont.

of the state.

ECONOTES: Salsola rarely occurs in dense stands. Most often, scattered plants occur in the general area of the MHW driftline on coastal sandy beaches.

ROOTS: Simple, shallow.

STEMS: Occasionally upright but more often sprawling, diffusely branched, sometimes forming mats up to 50 cm across, very tough, approaching woodiness.

LEAVES: Alternate, awl-shaped, stiff, spine-tipped.

FLOWERS/FRUITS: Inconspicuous, minute.

Sueda — Sea blite

*CAUTION: Four species of Sueda occur in Maine. At arm's length they are practically identical. Even with proper magnification, dissection tools, and mature fruiting material a trained observer encounters difficulty in delineating the species. Definite species identification can only rarely be made from vegetative material, and then only by an expert. Fortunately, all four species are indicators.

Sueda americana — Sea blite

GROWTH HABIT: Prostrate, densely covered with fleshy leaves, heavily branched, shallow rooted annual.

HABITAT: At and just above MHW mostly on sea strands, occasional in salt marshes.

Sueda americana Cont.

OCCURRENCE: Rare, or at least rarely identified; apparently coastwide, but records are too few to give a clear indication. Fewer than five collections have been made of this plant since 1900 in the State of Maine. (Excluding those collected for this work)

ECONOTES: Extremely variable in response to environmental conditions. Seems generally to prefer sand or light gravel substrates to the dense peaty soil of salt marshes. This species tends to persist for a period of time following frost, after which the plant turns a deep magenta-to-violet.

ROOTS: Shallow and simple.

STEMS: Usually prostrate, sprawling, heavily branched.

LEAVES: Alternate, very succulent, fleshy, up to 2.5 cm long.

FLOWERS: Minute, less than 3 mm broad, occurring in the axils of the leaves, petals absent, 5 green sepals, irregular, some of them usually strongly keeled.

FRUIT: A single seed produced by each flower, 1.2-1.5 mm broad, tan-brown in color, fruits maturing very late (Sept.-Oct.).

Sueda linearis Sea blite

GROWTH HABIT: Usually erect or leaning, fleshy leaves, shallow rooted, annual.

HABITAT: At and just above MHW in salt marshes, especially in sandy areas.

Sueda linearis Cont.

OCCURRENCE: Frequent and often abundant. Mostly in the southern areas of the coast.

ECONOTES: Variable in response to environmental conditions but probably the most distinctive of the Suedas. Turns very dark green-black when preserved. Usually dying back with the first good frost.

ROOTS: Simple and shallow.

STEMS: Usually erect, up to 90 cm in height, stiff, sometimes with evident irregular longitudinal ribs. Moderately branched, the branches ascending sharply (as opposed to drooping), not fleshy.

LEAVES: Alternate, long (sometimes more than 5 cm), very slender cylindrical, usually about 20 times as long as broad. Fleshy, deep green, lacking a waxy coating (glaucous bloom).

FLOWERS: Similar to S. americana but the sepals uniformly rounded on the back.

FRUIT: Similar to S. americana but the seeds 1.2-1.4 mm broad, black.

Sueda maritima Sea blite

GROWTH HABIT: Extremely variable, erect, ascending, or prostrate. Simple or branching, fleshy leaved, shallow rooted, annual.

HABITAT: Slightly above to slightly below MHW in salt marshes, occasional on sea strands.

OCCURRENCE: Common and abundant; coastwide.

Sueda maritima Cont.

ECONOTES: Our most common, abundant, and widely distributed Sueda, S. maritima is by far the most variable. It exhibits a wide range of forms in response to environmental variation. It tends to be scattered throughout a marsh but may densely colonize disturbed areas. Dying back very soon after the first frost.

ROOTS: Shallow and simple.

STEMS: Highly variable, stiff and erect to weak and ascending to limp and sprawling, simple to heavily branched, rarely as long as 50 cm, not fleshy.

LEAVES: Alternate, very fleshy, usually 2-3 cm in length, very slender cylindrical, typically covered with a white waxy coating (glaucous bloom) which gives the plant a blue green or gray-green appearance.

FLOWERS: As in S. americana but sepals generally rounded (or with a faint keel) on the back.

FRUITS: As in S. americana but seeds 1.8-2 mm broad, reddish-brown to mahogany, occasionally black.

Sueda richii — Sea blite

GROWTH HABIT: Prostrate, heavily branched, fleshy leaved, shallow rooted, annual.

HABITAT: At and just above MHW in salt marshes.

OCCURRENCE: Infrequent but sometimes abundant in a given locality; mostly in the southern range of the coast.

Sueda richii Cont.

ECONOTES: Variable, like other members of the genus. Specimens as small as 1 cm have been observed to fruit.

ROOTS: Simple and shallow.

STEMS: Prostrate, heavily and alternately branched, the branches also lying flat on the substrate and thereby generally two-ranked, stems stiff, not fleshy. Forming mats up to 50 cm across.

LEAVES: Alternate, fleshy, generally slender cylindrical but usually flattened on the lower surface, up to 1-4 cm in length except on flowering branches (3.5-5.5 mm long in the situation), dark green, lacking a waxy covering.

FLOWERS/FRUITS: As in S. americana.

Acnida cannabina — Water Hemp

GROWTH HABIT: A coarse, erect, thick stemmed, leafy, shallowly rooted annual herb.

HABITAT: Well below MHW, often on the lower borders of salt marshes, similarly placed on rich tidal shores.

OCCURRENCE: Uncommon but occasionally abundant in a given locality; only in the southern range of the Maine coast.

ECONOTES: Often interspersed with Spartina alterniflora.

ROOTS: Shallow, minimally developed.

STEMS: Erect, slender to very stout, fleshy (often appearing to be partially collapsed internally), hairless, from 30 cm to over 2 m in height.

LEAVES: Long, slender, spear-head shaped (lanceolate), tapering

Acnida cannabina Cont.

FLOWERS: Greenish, tiny, inconspicuous, interspersed with numerous, tiny, pointed, leafy bracts, arranged in simple or large clusters originating from the leaf axils.

FRUIT: Ovoid, 2.5-4 mm long, with longitudinal ribs, seeds egg-shaped, 2-3.5 mm long.

Arenaria peploides — Seabeach Sandwort

GROWTH HABIT: A robust, sprawling, opposite leaved, succulent, deep-rooted herb.

HABITAT: Just above MHW on sandy, gravelly, and rocky beaches.

OCCURRENCE: Infrequent, occasionally abundant in a given area; coastwide but more commonly in the northern range of the state.

ECONOTES: New plants spread radially from the old root system each spring forming dense mats up to 1 m across.

ROOTS: Slender, deep, branched, perennial.

STEMS: Simple to heavily branched.

LEAVES: Opposite, simple, sessile, clasping, each opposing pair forming a thin collar of leafy tissue across the stem, leaves extremely thick and fleshy, spade-shaped with the tip pointing outwards.

FLOWERS: Borne in leafy clusters at thetips of branches or may occur singly in the axils of the upper leaves, each flower 7-12 mm broad with 6 white petals and 6 green sepals.

FRUIT: A capsule, globose or nearly so, thick skinned, 5-12 mm broad, divided into 3-5 sections, each section containing a few pear-shaped seeds, the seeds 3-4.5 mm long.

Spergularia marina — Sand Spurrey

GROWTH HABIT: A small, leafy, shallow fibrous rooted annual herb.

HABITAT: Above MHW in salt marshes and stable sandy saline habitats, usually not in loose sands.

OCCURRENCE: Common although not usually abundant; coastwide.

ECONOTES: The fibrous roots of sand spurrey allow it to exist very successfully in sandy habitats that are stabilized by the presence of deeper rooted species. The shallowness of its own roots prevents it from effectively colonizing the loose sands of open dunes and beaches.

ROOTS: Shallow, diffuse, fibrous.

STEMS: Erect, occasionally up to 40 cm sometimes sprawling, with very long branches (in proportion to the plant).

LEAVES: Opposite, up to 4 cm long, 6-15 mm broad, with a blunt point at the top, hairless or sometimes covered with sticky hairs, stipules triangular about as long (2-4 mm) as broad. Usually brownish to off-green in color.

FLOWERS: In small branches clusters towards the upper fourth of the plant, the 5 brownish-green sepals much longer than the 5 inconspicuous white or pink petals.

FRUIT: An ovoid capsule 3.5-6.5 mm long, filled with pale brown to reddish pear-shaped seeds, seeds 0.5-0.8 mm long.

Cakile edentula — Sea Rocket

GROWTH HABIT: A course, stemmy, fleshy leaved, shallow rooted annual.

Cakile edentula Cont.

HABITAT: Slightly above and sometimes down to MHW on beaches, occasional on sea strands.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Sea rocket occurs most abundantly in the proximity of the MHW drift line of sandy beaches. It often co-occurs with Salsola kali. Like most plants of the habitat, it rarely occurs in dense colonies, rather, individuals tend to be scattered and well separated from one another. An excellent diagnostic character is the pungent peppery juice that the plant exudes when damaged. Both the odor and flavor are unique in beach environments. This is especially helpful since very often all that can be found of a plant is the tough persistent stems.

ROOTS: Shallow and simple.

STEMS: Usually prostrate, spreading, very tough, and fibrous, simple to widely and tortuously branched.

FLOWERS: Small, 4-11 mm, with 4 green sepals and 4 delicate lavender-pinkish-white petals, 6 stamens (4 long and 2 short).

FRUIT: A jointed capsule, 10-20 mm long, the lower half cylindrical in shape, the upper portion generally egg-shaped but tapering to a slender point.

Potentilla anserina — Silverweed

GROWTH HABIT: An erect, rhizomatous plant with leafless flowering stems, each bearing a single gold flower, the leaves pinnately compound with white hairy undersides.

HABITAT: Above MHW on beaches, sea strands, and salt marshes.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Spreads rapidly by means of creeping stolons in the same way as strawberries. The silvery appearance of the underside of the leaves results from the dense covering of fine white silky hairs.

ROOTS: Deep and well-developed with a dark brown shaggy fibrous skin.

STEMS: Simple, erect, unbranched, leafless, delicate, succulent, usually pinkish in color.

FLOWERS: Borne singly at the tips of the stems, with 10 green, usually hairy sepals, and 5 gold-yellow petals, the entire blossom 1-2.5 cm broad.

FRUIT: A shallow hemispherical cluster of tan to brown to reddish ovoid to nearly spherical seeds, the cluster appearing somewhat like a dried up strawberry.

Rosa rugosa — Salt Spray Rose

GROWTH HABITAT: A typical rose, very robust.

HABITAT: Above MHW on dunes and beaches, mostly in exposed locations where it is often subjected to windblown salt spray.

Rosa rugosa Cont.

OCCURRENCE: Common but sporadic; coastwide.

ECONOTES: Can be cultivated in non-coastal habitats but under natural circumstances is restricted to coastal habitats. Because of this property it should not be solely relied upon as an indicator.

ROOTS: Very deep, branched, woody.

STEMS: Stout, branched, thorny.

LEAVES: Alternate, pinnately compound, the leaflets oval, with very deep veins, a pair of stipules at the base of each leaf, leaves very dark green.

FLOWERS/FRUITS: A large 5 petaled pink rose, fruit a large orange seedy rose-hip.

Euphorbia polygonifolia Seaside Spurge

GROWTH HABIT: Leafy, branched, matted, with milky sap, and flowers of very unusual structure.

HABITAT: Above MHW on beaches and sheltered areas of dunes.

OCCURRENCE: Rare or non-existent within the state.

ECONOTES: Possibly occurring on some of our offshore islands.

STEMS: Branched, sometimes sparingly, plants occasionally up to 0.5 m across, in a mat on the substrate or ascending at the tips, the stems exuding a thick acrid milky juice when broken.

LEAVES: Mostly opposite, very light green, fleshy, narrow oblong or narrow egg-shaped, up to 1.5 cm long, the midrib evident, the tip of the leaf narrowing very suddenly to a short blunt point.

Euphorbia polygonifolia Cont.

FLOWERS/FRUITS: Yellow green, of very unusual structure, fruit a capsule.

Lathyrus japonicus — Beach Pea

GROWTH HABIT: Nearly identical to the domestic garden pea but with usually purple to blue or pink flowers.

HABITAT: Above MHW in sand and loose gravels of beaches and sea strands.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Often forming a very dense border along the upper borders of beaches and sea strands. Plants rarely occur solitarily.

ROOTS: Slender, extensively branched and creeping.

STEMS: Sharply angled, widely branched, viny, up to 1.5 m in length, adjacent plants usually intertangled.

LEAVES: Alternate, pinnately compound, each leaf with 4-10 leaflets, the leaflets 1-5 cm long, 0.5-3.5 cm broad, usually a branched tendril at the tip of the leaf, and a pair of squarish leafy stipules at the base.

FLOWERS: Pink to magenta to blue, 1.5-2.8 cm long, 3-10 occurring on each leafless flowering stalk.

FRUIT: A small relatively flat "pea-pod" 2.5-6.5 cm long.

Hudsonia tomentosa — Beach Heath

GROWTH HABIT: A low shrubby, woody plant, multiply branched, with deep spreading roots.

HABITAT: Dunes.

OCCURRENCE: Common and abundant; nearly coastwide, but much more frequent in the southern portion of the coast.

Hudsonia tomentosa Cont.

ECONOTES: Occasionally occurring as single plants but most often in fairly extensive dense patches.

ROOTS: Slender, woody, deep, spreading laterally, covered by a dark brown shaggy fibrous skin.

STEMS: Woody, low (up to 20 cm), erect to ascending or procumbent, extensively spreading and branching.

LEAVES: Spirally alternate, gray-green, small, 1-1.8 mm long, narrowly triangular, densely covered with fine wooly hair, the individual leaves overlapping so tightly as to form a "scaly" covering surrounding the entire stem, the leaf-tips curving inward toward the stem.

FLOWERS: Nested in the axils of the leaves on the outer tips of the branches, each with 5 small sepals (2 mm long) and 5 bright sulphur-yellow petals.

FRUIT: A small one or two seeded capsule.

Lechea maritima Pinweed

GROWTH HABIT: small to moderate, densely hairy leaves, and a leafy overwintering rootstock.

HABITAT: Dunes and sandy coastal flats above MHW.

OCCURRENCE: Frequent but usually sporadic; almost exclusively along the southern range of the coast.

ECONOTES: Possesses a stout, leafy, overwintering, rootstalk (candex). The name pinweed from the appearance of the fruiting branches, the globe shaped fruits at the ends of proportionately long thin branches.

Lechea maritima Cont.

ROOTS: Very deep, stout, branching below the surface simple or branching into several stiff upright stalks.

STEMS: OF 2 TYPES: Non-flowering shoots from the apex of the rootstalk up to 10 cm high, covered with short dense wooly hair; the flowering stems very stiff, upright or leaning, with long straight branches, the branches diverging at broad angles from the lower half of the stem, the branches themselves similarly branched, main axis up to 30 cm high.

LEAVES: Thick but not fleshy, gray-green, closely overlapping, elliptical to spear-head shaped (narrow), the underside of the leaves densely covered with wooly hair.

FLOWERS/FRUITS: Sepals in a cup shaped arrangement, fruit a globose capsule 1.5-2 mm broad with 2-5 small (.7-1.1 mm) seeds.

Ligusticum scothicum — Scotch Lovage

GROWTH HABIT: An erect, very leafy perennial herb with white flowers in flat-topped clusters, deep carrot-like roots, and a conspicuous parsley-like odor.

HABITAT: Above MHW in salt marshes and sea strands, occasional on beaches.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Among the most flexible of species from the standpoint of its ability to survive in a range of environmental conditions. It occurs from fully exposed open coastal areas ranging into brackish estuarine marshes in all types of substrates.

Ligusticum scothicum Cont.

ROOTS: Woody, robust, very deep, usually sparingly branched, covered by a coarse brown skin.

STEMS: Usually several arising from the summit of the root, simple or sparingly branched, characteristically reddish or purplish toward the base.

LEAVES: Alternate, compound in subdivisions of 3 (ternate), up to 30 cm long, the coarsely and unevenly toothed leaflets somewhat fleshy, 2.5-5 cm long, the petiole flared at the base and forming a coarsely-veined flared, collar around the stem.

FLOWERS: In flat-topped clusters at the summit of major stems, the individual flowers tiny, white-cream colored, four-petaled.

FRUITS: Shiny, narrowly elliptical, 0.5-1.0 cm, with strong longitudinal ribs.

Glaux maritima — Sea Milkwort

GROWTH HABIT: A small, erect to ascending, opposite leaved, deep rooted, perennial herb.

HABITAT: At and just above MHW in salt marshes and sea strands, occasional on beaches.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: May be carelessly confused with Beach Sandwort (Arenaria peploides) in the occasional situations where both occur in the same locality.

ROOTS: Deep, nearly vertical, weak, loosely branched, whitened, about the same thickness as the stem (2-4 mm).

STEMS: Erect or ascending, 5-30 cm high, simple to heavily branched.

Glaux maritima Cont.

LEAVES: Opposite, simple, sessile (lacking a petiole), oval to oblong, 5-15 mm long, 3-8 mm broad, partly clasping the stem at the base.

FLOWERS: Borne singly in the axils of the upper leaves, 3-5 mm long, 5 pink to scarlet petals fused into a bell-shaped blossom.

FRUIT: A capsule, 2-5 mm long, slightly less broad.

Samolus parviflorus — Water pimpernel

GROWTH HABIT: Small, erect, leaves strictly basal, shallow rooted, easily overlooked, annual.

HABITAT: At and below MHW on the shores of estuaries, ranging from saline to brackish conditions, occasional in most coastal wetland habitats.

OCCURRENCE: Infrequent but usually abundant in a given locality; coastwide.

ECONOTES: Although water pimpernel occurs in saline habitats, it reaches its greatest abundance in brackish waters. It also appears to be very tolerant to reduced light and often is observed in shaded areas.

ROOTS: Shallow, fibrous.

STEMS: Mostly erect, up to 50 cm, simple or occasionally with minor branching of the main axis towards the summit, leafless or with very few tiny leaves, the inflorescence with short simple branches.

LEAVES: Almost strictly basal in a tight rosette resting on the substrate, 1-4 cm long, 0.5-2.5 cm broad, egg-shaped, distinctly veined.

Samolus parviflorus Cont.

FLOWERS: Small, 3-6 mm broad, 5 petalled, white, slightly bell-shaped.

FRUIT: A capsule, 2-3 mm long.

Limonium nashii — Sea Lavender

*CAUTION: Recent changes have been made in the nomenclature of this genus. Formerly two species of Limonium (the other are being L. carolinianum) were described for our geographic range. This system has been revised such that only L. nashii is now recognized; the previously distinguished L. carolinianum is now lumped into L. nashii. However, it is unlikely that this change will find its way into commonly used botanical manuals for some time.

GROWTH HABIT: A moderately sized, showy, lavender flowered, basally leaved, deep-rooted, perennial herb.

HABITAT: Occasionally at but usually just above MHW in salt marshes, occasional on sea strands.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Typically occurs in well stabilized substrates, notably the rhizome mats of mature salt marshes. Infrequent in sandy or gravelly substrates unless they are underlain by more nutrient rich substrate. Often co-occurs with Seaside Goldenrod. Very persistent. The stems remain long into the winter and are occasionally identifiable even into early spring. New plants arise from the old root each year.

Limonium nashii Cont.

ROOTS: Stout, very deep, vertical, woody, simple to sparingly branched, covered with shaggy dark-brown skin.

STEMS: Leafless, up to 60 cm high, profusely branched at the summit into an expansive flower cluster.

LEAVES: Strictly basal up to 40 cm long, in a loose rosette, generally egg-shaped, tapering very gradually to a long, narrow, partially clasping base, often with reddish-magenta to brownish splotches.

FLOWERS: In a large, open, profusely branched cluster, the individual flowers with 5 sharp-pointed sepals united in a funnel shaped arrangement and 5 dry papery lavender or white petals, the entire flower usually 2-2.5 mm long.

FRUITS: A small membranaceous capsule hidden within the persistent sepals.

Mertensia maritima — Oysterleaf, Sea Lungwort

GROWTH HABIT: Prostrate, creeping, with succulent blueish leaves, pink and blue flowers, deep roots, perennial.

HABITAT: Above MHW on rocky or gravelly beaches, occasionally on sand and sea strands.

OCCURRENCE: Uncommon, rarely abundant; coastwide but most frequent along the northern range of the coast.

ECONOTES: Usually occurring as scattered individual plants, rarely in small groups. Sometimes co-occurs with Arenaria peploides. A totally unique plant, totally unmistakeable for anything else. Invariably the color decays to yellow-ochre-rusty

Mertensia maritima Cont.

brown after frost or after being picked, no matter what efforts are made for preservation.

ROOTS: Woody, slender, deep.

STEMS: Prostrate, heavily branched, forming a dense mat creeping along the substrate, generally radiating from the apex of the root system toward the downshore, mats occasionally approaching a meter across although typically 40-60 cm at maturity.

LEAVES: Egg-shaped to rounded-diamond-shaped, up to 8 cm long, slightly less wide, very thick and fleshy, distinctly blue to blue-green in color from a dense waxy coating on the leaf surfaces.

FLOWERS: In small, branched clusters at the tips of the branches, the 5 petals fused into a bell to funnel-shaped blossom, pink when young, becoming blue (rarely white) with age and eventually falling off. The green dish-shaped calyx persistent.

FRUIT: A small, shiny, sharp-pointed, but generally rounded nutlet, borne in the persistent calyx.

Gerardia maritima Gerardia

GROWTH HABIT: An erect, narrow leaved, showy flowered, shallow rooted, annual herb.

HABITAT: Above MHW, mostly in salt marshes, occasional in other saline-brackish habitats.

Gerardia maritima Cont.

OCCURRENCE: Common and abundant; mostly in the southern range of the coast, occasional elsewhere.

ECONOTES: Typical in the proximity of the upland border of our southern coastal marshes.

ROOTS: Shallow, simple, poorly developed.

STEMS: Erect, 5-50 cm high, simple or branched in the upper portion, four-angled in cross-section.

LEAVES: Alternate, partially clasping with a pronounced midrib, bright green-to-purplish long and narrow, 1.5-3 cm broad and typically ten times as long, tapering gradually toward both ends, the tip sharp-pointed.

FLOWERS: In sparingly leafy, simply branched clusters in the upper portion of the plant, the 5 bright pink petals fused into a funnel-shaped blossom, extending beyond the dish-shaped calyx of 5 fused green sepals.

FRUIT: A hemispherical capsule 5-6 mm long, seeds 1-1.2 mm long.

Plantago juncoides — Seaside Plantain, Goosetongue

GROWTH HABIT: An erect deep-rooted perennial herb with a basal rosette of long narrow fleshy succulent leaves and vertical leafless flower stalks.

HABITAT: Slightly below to just above MHW mostly in salt marshes, less frequent on sea strands.

OCCURRENCE: Common and abundant; coastwide.

Plantago juncoides

ECONOTES: Generally scattered singly or in small groups throughout salt-marshes, often occurring in dense stands on sea strands.

ROOTS: Very deep, woody, simple or forking, covered by a thick coarse brown shaggy skin.

STEMS: Leafless, supporting only the flowers, vertical, occasionally up to 25 cm high, one-several per plant.

LEAVES: Strictly basal, in a rosette, usually shorter than the stems, long, narrow, thick, fleshy, slightly clasping at the base narrowing gradual to a point, usually conspicuous longitudinal veins on the inner surface, broadly v-shaped in cross-section, frosty green in color, very often with reddish-purple splotches.

FLOWERS/FRUITS: Inconspicuous, arranged in a tight narrow cylindrical spike on the upper third of the stem (individual flowers stemless), the diagnostic characters minute and difficult to observe. Generally the flowers and fruits are greenish-brown, appearing as egg-shaped-to broadly conic buds.

Asteraceae — The Composite Family

*CAUTION: The remainder of the indicator species in the guide are all members of the Asteraceae. This is the largest family of flowering plants in the world with literally thousands of species. As a result of this tremendous diversity the technical distinctions between species are extremely "fine lined". Descriptions of flowers and fruit structure especially are extremely technical.

Asteraceae Cont.

For the purposes of this guide, the descriptions are fairly general; technical terminology is avoided in order to make descriptions understandable. This is, however, partly at the expense of accuracy. If doubt remains as to the identity of a given speciman it is advisable to consult one of the technical manuals, such as Gray's Manual, or a trained authority.

Artemisia stelleriana* Dusty Miller

GROWTH HABIT: A white-wooly, lacy leaved, deep-rooted perennial herb.

HABITAT: Dunes, occasionally in other types of sandy coastal habitats well above MHW.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Dusty Miller is ideally suited for living on dunes in a number of ways. The dense wooly hair covering the leaves slows air movement and thereby retards moisture loss into the air. The deeply divided leaves efficiently dissipate heat via convection into the surrounding air. And finally, the woody, stout, deep, extensively developed roots anchor the plant firmly against erosion while providing moisture for survival.

ROOTS: As described in econotes, covered by a brown shaggy skin.

STEMS: Stout, covered with white-wooly hair, spreading but remaining close to the substrate. The flowering stems ascending to erect.

FLOWERS: In a tight cylindrical cluster at the summit of the stem,

Artemisia stelleriana Cont.

FRUITS: Seeds slender egg-shaped, 2-3 mm long.

Aster novi-belgii* Salt Marsh Aster

*CAUTION: This species is extremely difficult to differentiate from (not only another upland variety of the same species, but also) a large assemblage of terrestrial Aster species. It should probably be considered a last resort as an indicator and not relied upon unless absolutely necessary and then only when its identity can be unconditionally verified by an authority.

GROWTH HABIT: A stiffly erect leafy, showy-flowered, perennial herb.

HABITAT: Just above MHW in protected salt-marshes and to a lesser extent on saline shores.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: An extremely variable species, occurring in a range of salinities, with an apparent preference for brackish areas rather than full salinity, occasionally occurring as isolated individuals but most often forming a fairly dense belt of vegetation along the upland border of salt marshes.

ROOTS: Slender, woody, covered by a dark gray-brown skin, penetrating the ground at an angle.

STEMS: Stiffly erect, branching profusely in the upper third of the plant, usually with a spongy pith.

LEAVES: Alternate, basal leaves large (to 20 cm), oblong or

Aster novi-belgii Cont.

FLOWERS: Occurring in fairly dense clusters in the upper branches of the plant, the "petals" blue violet in heads up to 2 cm broad.

SEEDS: Shiny, flattened, light brown 2-2.5 mm long, topped by a dense tuft of shiny, silky, short, straight hairs.

Iva frutescens — Marsh Elder

GROWTH HABITAT: A large, shrubby, perennial herb.

HABITAT: Mostly above MHW in salt marshes.

OCCURRENCE: Extremely rare if existent within the state; possibly along the extreme southern part of the coast.

ECONOTES: Within its primary range (Va. to N.H.) the plant is very large (up to 2 m) and coarsely shrubby. If it does indeed occur in Maine, it is likely to be of substantially lesser stature.

ROOTS: Deep, branched, woody.

STEMS: Typically 1/2 to 2 m high, stout, smooth or with conspicuous longitudinal veins, often extensively branched especially near the top.

LEAVES: Basal and lower leaves large, oval or elliptical, 4-7 cm long, fleshy, the margins coarsely toothed, the upper leaves smaller, spearhead-shaped, also toothed.

FLOWERS/FRUITS: In elongate branched clusters of small heads, the clusters arising from the axils of the upper leaves, the individual heads usually drooping, 5-6 mm broad, seeds 2.5-3.2 mm long.

Solidago sempervirens* Seaside Goldenrod

GROWTH HABIT: An erect, robust, leafy, showy flowered, deep-rooted, perennial herb.

HABITAT: Just above MHW in salt marshes.

OCCURRENCE: Common and abundant; coastwide.

ECONOTES: Seaside Goldenrod is one of the most conspicuous widely recognized of coastal wetland indicator species. It occurs abundantly chiefly in mature stable marshes. The stout stems often persist into late autumn. New plants are generated from the old rhizomes each spring. It tends to be most abundant on raised areas and in the proximity of the upland borders of the marsh.

ROOTS: Very deep, stout, woody, branching, with an extensive development of fibrous secondary roots.

STEMS: Stiffly erect, the outer layer very tough and fibrous, the pith white and spongy, the skin usually magenta-purplish towards the base especially late in the season, branching only near the top into an elongate flower cluster.

LEAVES: Alternate, thick, often fleshy, smooth, shiny, the basal leaves up to 40 cm long, egg-shaped at the tip, gradually tapering into a long petiole, the veins often magenta-purple, the stem leaves much smaller (rarely 15 cm), generally the same shape but lacking a definite petiole. The leaves on the lower portion of the plant clasping a half to three fourths of the circumference of the stem.

Solidago sempervirens*

FLOWERS: Dark gold, in large, many branched, elliptical clusters, the clusters made up of hundred of small (4-7.5 mm) hemispherical heads, each head with 3-4 rows of overlapping green spearhead shaped 'sepals'.

SEEDS: Slightly hairy, 2.5-3.5 mm long, topped by a tuft of cream-colored silky hairs.

Xanthium echinatum* Sea-Burdock

GROWTH HABIT: A large, husky, coarse, large leaved, perennial herb. Very similar in appearance to the common terrestrial burdock.

HABITAT: Well above MHW in loose sandy, gravelly, saline-brackish substrates and dunes.

OCCURRENCE: Uncommon; occasional along the southern range of the coast, rarely as far north as the Penobscot River.

ECONOTES: Common south of Maine. Produces a pungent, bitter, acrid odor when crushed.

ROOTS: Simple, or sparingly branched, shallow to very deep, with profuse coarse root-hairs.

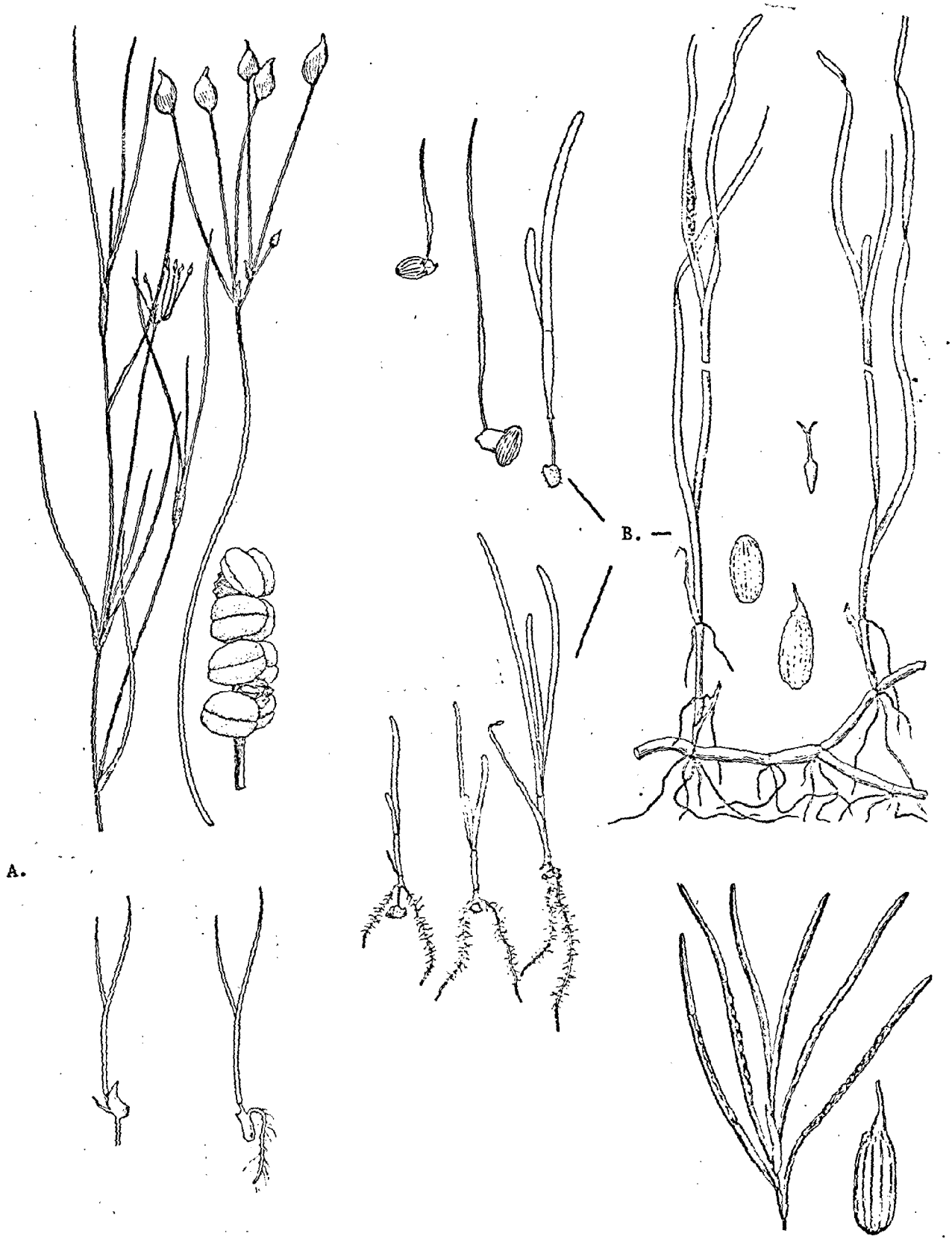
STEMS: Upright, thick, robust, often heavily branched. Occasionally up to 1 m in height.

LEAVES: Alternate, variable, heart-shaped to egg-shaped to maple leaf-shaped depending on the maturity and stature of the plant, dark green often mottled with purple splotches covered with very short stiff bristly hairs, the uneven

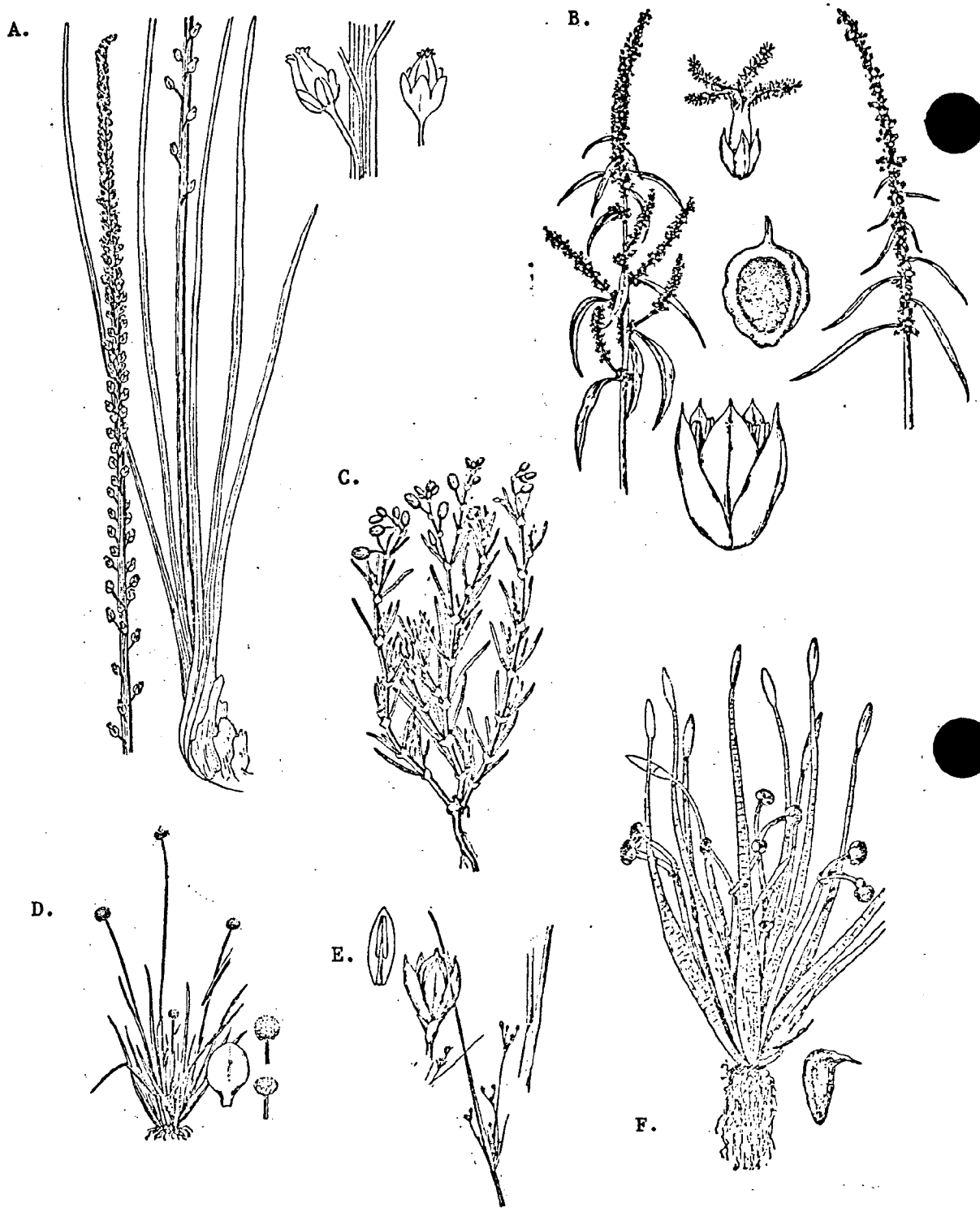
Xanthium echinatum* Cont.

margins with shallow rounded teeth, leaves up to 20 cm long and about as broad.

FRUIT: A green to pale brown, olive-shaped burr, 2-3 cm long, 1-3 cm thick, covered with short silky hairs and stout curved beaks (3-5 mm long).

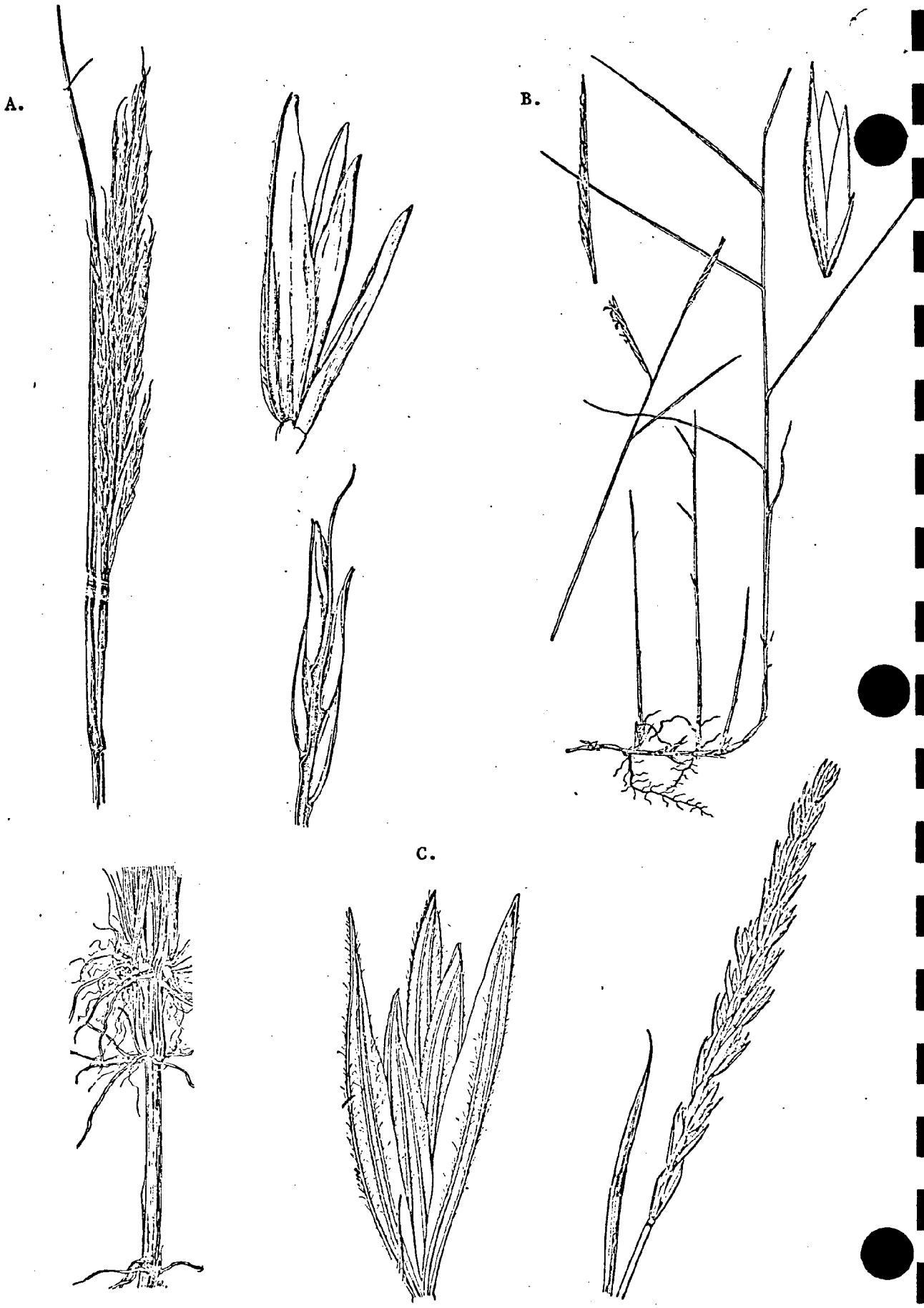


A. Ruppia maritima
B. Zostera marina



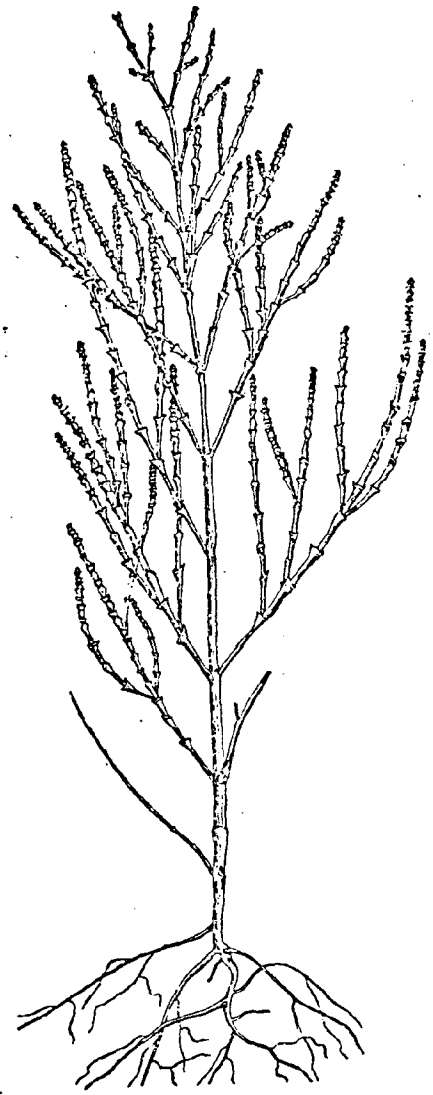
A. Triglochin maritima
B. Acnida cannabina
C. Spergularia marina
D. Eriocaulon parkeri
E. Juncus gerardi
F. Lophotocarpus spongiosus

A. Ammophila breviligulata
B. Distichlis spicata

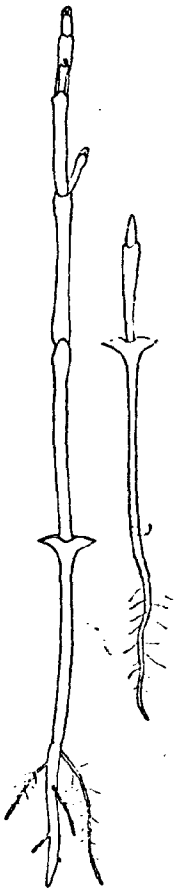


A. Spartina alterniflora
B. Spartina patens
C. Elymus arenarius

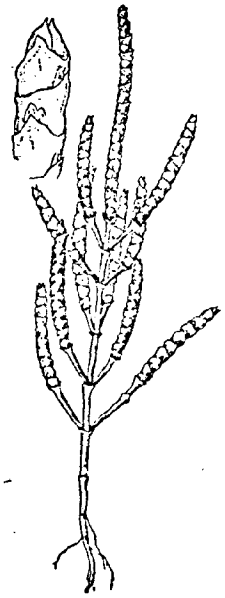
A. Scippus paludosus
B. Scirpus maritimus
C. Eleocharis halophila
D. Carex paleacea



A.

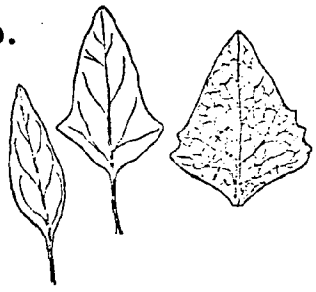


B.

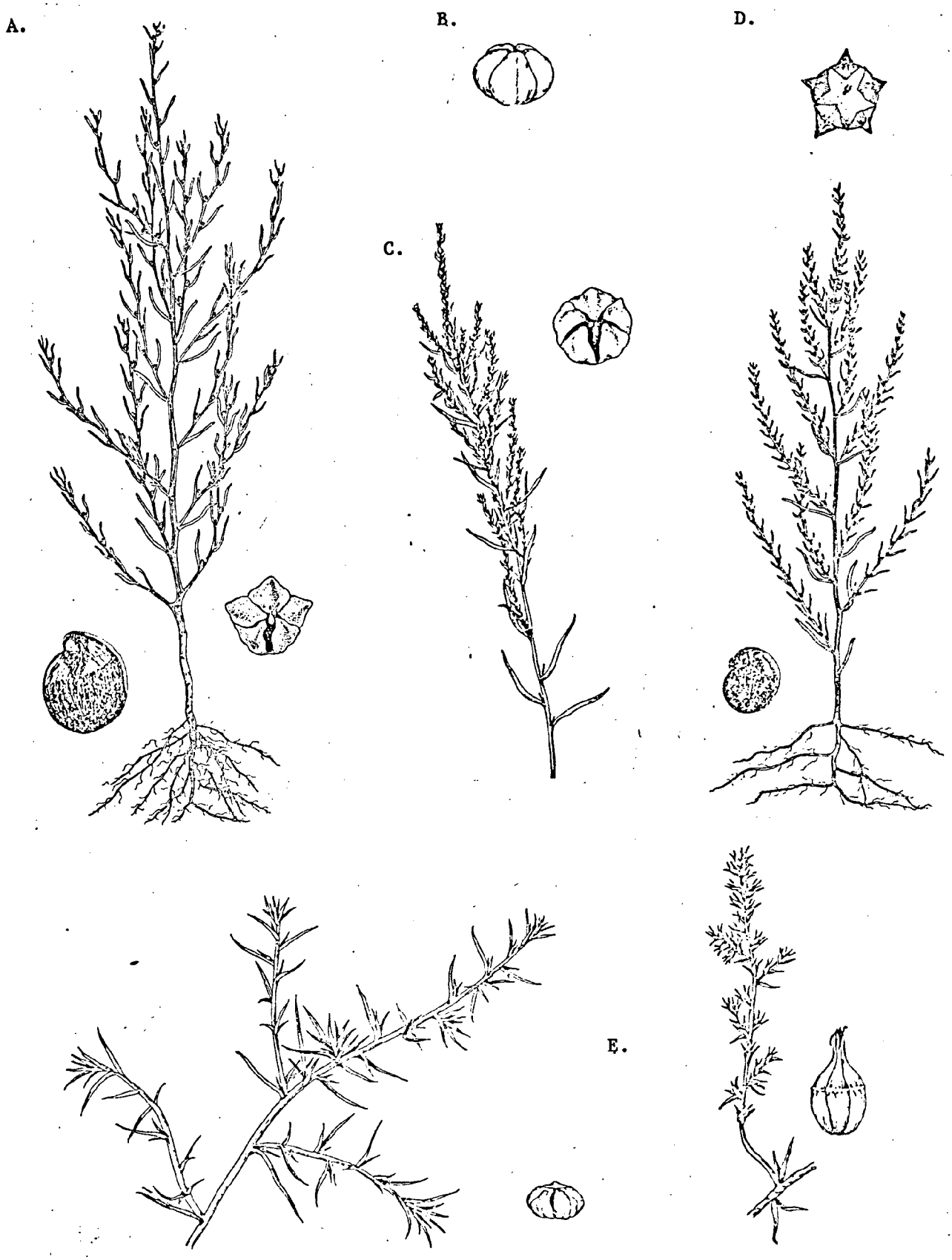


C.

D.

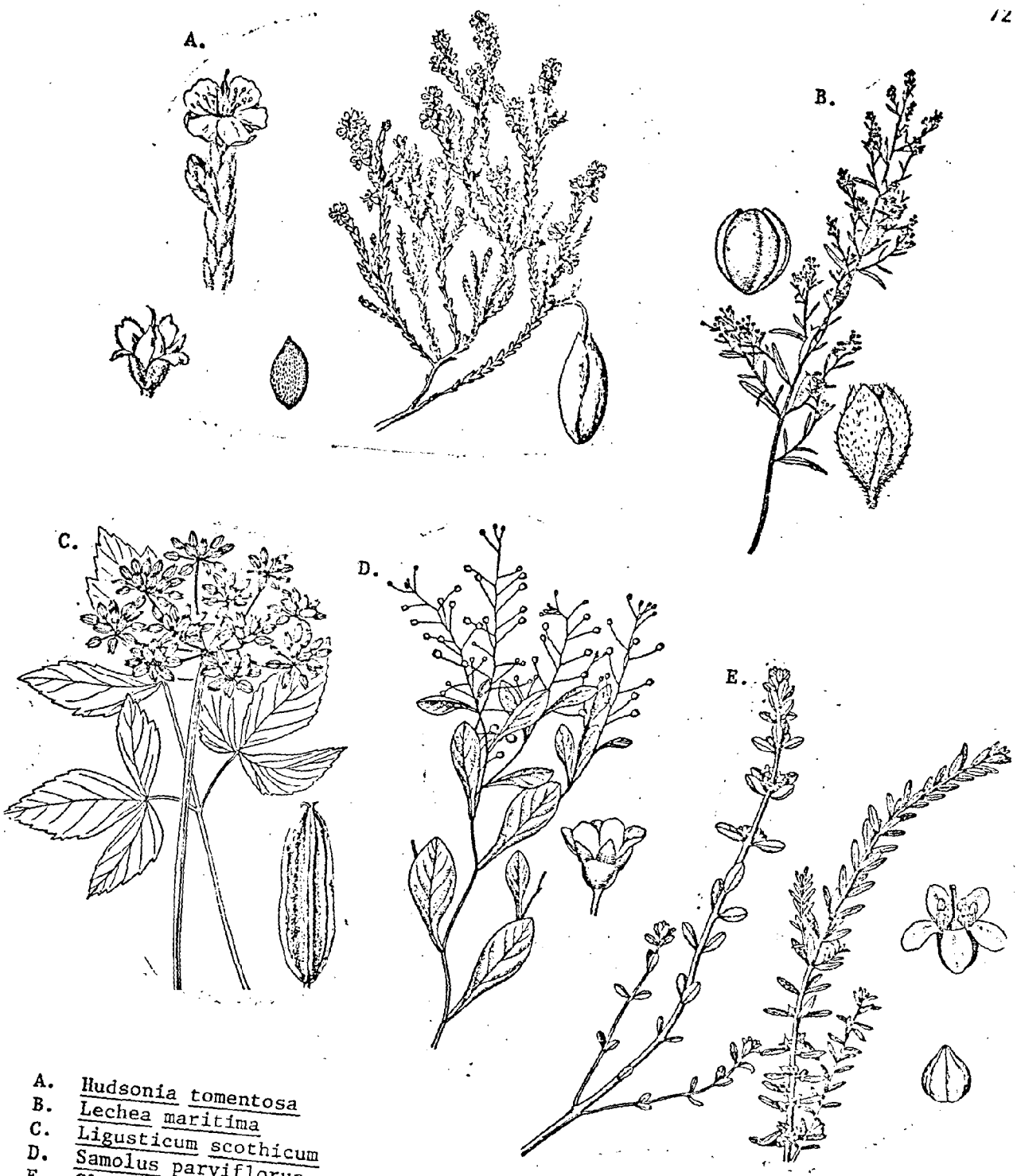


A. Salicornia europaea
B. Salicornia bigelorii
C. Atriplex patula
D. Atriplex glabriuscula

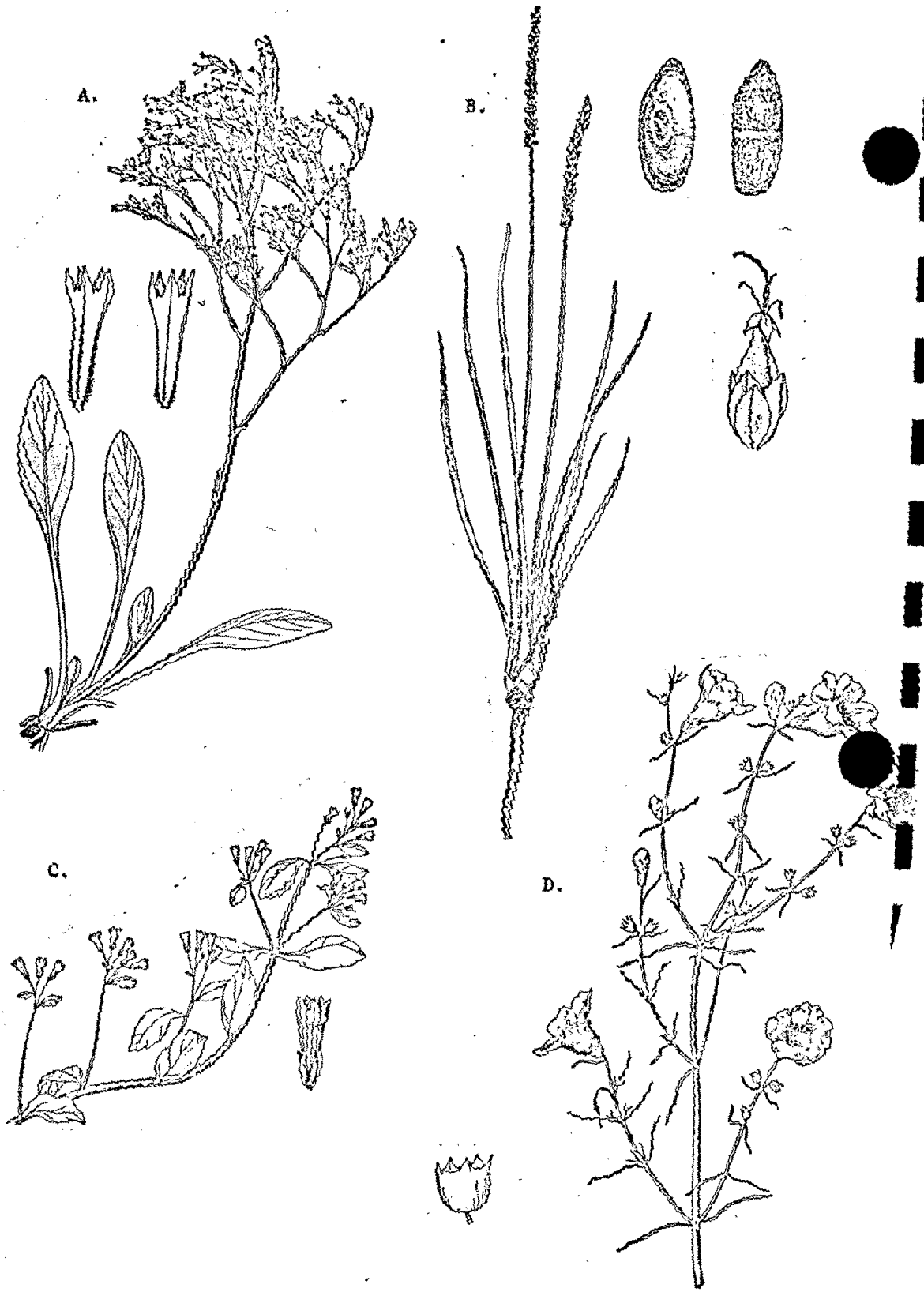


A. Sueda maritima
B. Sueda richii
C. Sueda americana
D. Sueda linearis
E. Salsola kali

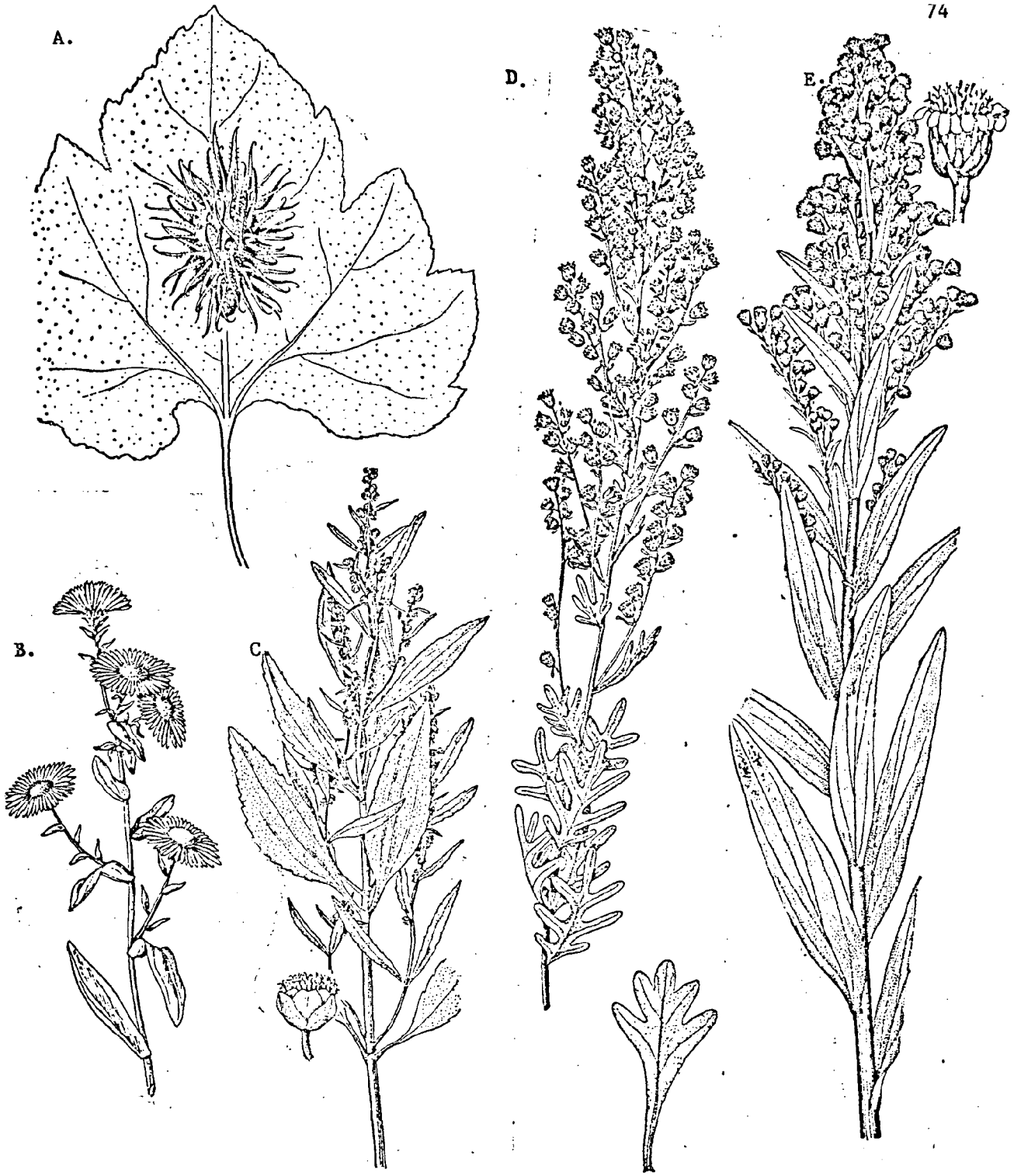
A. Rosa rugosa
B. Potentilla anserina
C. Euphorbia polygonifolia
D. Cakile edentula
E. Lathyrus japonicus



A. Hudsonia tomentosa
B. Lechea maritima
C. Ligusticum scothicum
D. Samolus parviflorus
E. Glaux maritima



A. Limonium nashii
B. Plantago maritima
C. Mertensia maritima
D. Gerardia maritima



A. Xanthium echinatum
B. Aster novi-belgii
C. Iva frutescens
D. Artemisia stelleriana
E. Solidago sempervirens

GLOSSARY OF TERMS

ACRID: Bitter acid, usually in reference to odor, sometimes to taste.

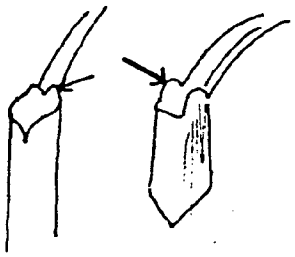
ALTERNATE: See leaf.

ANTHER: See flower.

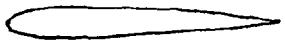
ANNUAL: Completing the entire life cycle (see-death) in a single growing season.

ASCENDING: Growing upward from horizontal to a nearly vertical angle.

AURICLE: A flap of accessory leafy or papery tissue at the top of the leaft sheath, as in Juncus and Carex.

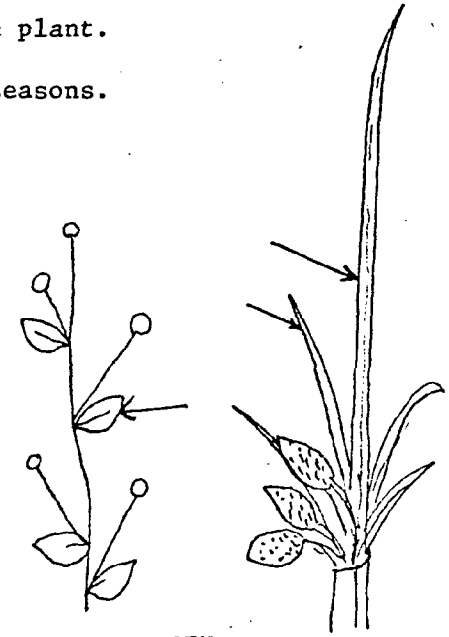


AWL-SHAPED: Self-descriptive.



AXIL: See leaf.

BASAL: Usually in reference to the positioning of the foliage leaves, the major leaves being restricted to the base of the plant.

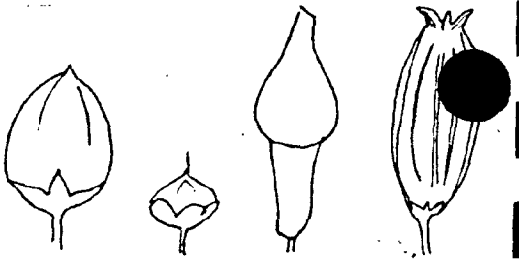


BIENNIAL: Completing the life cycle in two growing seasons.

BLADE: See leaf.

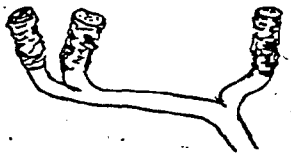
BRACT: A leaf usually of reduced size, positioned at the base of a flower or at the base of major branches of a flower cluster (inflorescence). These are typically referred to as involucral bracts or involucral leaves. The assemblage of several of these bracts at the base of a single flower or inflorescence is often referred to as the involucre.

CAPSULE: A type of fruit. A usually hollow, somewhat rounded structure derived from the ovary of a flower, containing the seeds. This capsule may be fleshy during the development



but later in the season it dries out and splits along 3-5 seams thereby releasing the mature seeds.

CAUDEX: When the base of a stem persists over-winter, that stem-base, occurring atop the root or rhizome, is referred to as a Caudex.



CHAFFY: Thin, papery, brittle, usually in reference to the texture of the involucral bracts.

CILIATE: Topped or covered by a fringe of hairs or bristles.

CROSS-SECTION: The end view of a horizontal slice.

DIMINUTIVE: Of markedly reduced size.

DISTICHOUS: See 2-ranked.

ELLIPTICAL: Having the outline of an ellipse.

ELONGATE: Of extended length, especially as it relates to breadth.

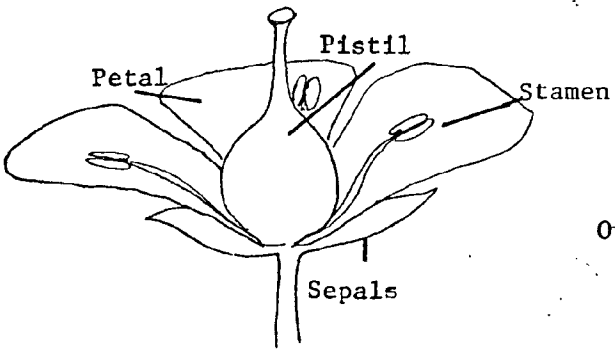
EMERGENT: Extending up out of or beyond something.

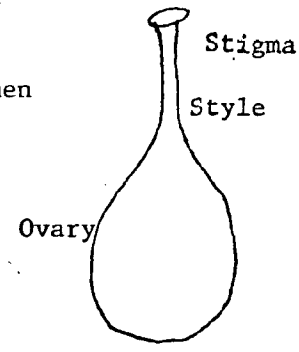
EQUINOX TIDES: The extremely high "moon tides" experienced in spring and fall.

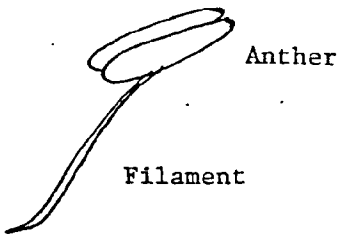
ERECT: Vertical.

EXCEEDING: Extending beyond. Ex. the petals exceeding the sepals, ie. the petals stick out beyond the sepals.

FLOWER: The reproductive apparatus of a plant, made up of several additional structures in various arrangements.







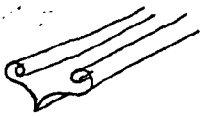
FUSED: Grown together, usually in reference to the sepals or petals. Ex. the petals, fused into a bell-shaped blossom.

GLOBOSE: Globe-shaped, usually in reference to fruits or seeds.

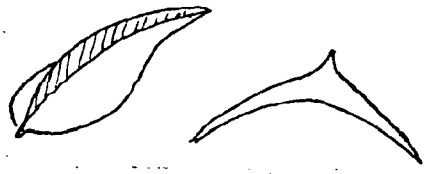
INFLORESCENCE: A branched flower cluster.

INTERNODE: See node.

INVOLUCRAL, IVOLUCRE: See bract.

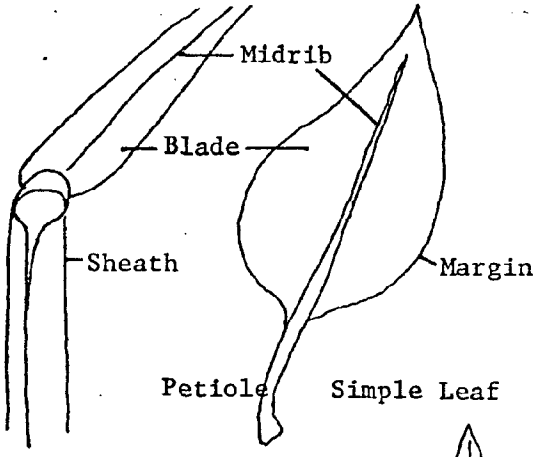


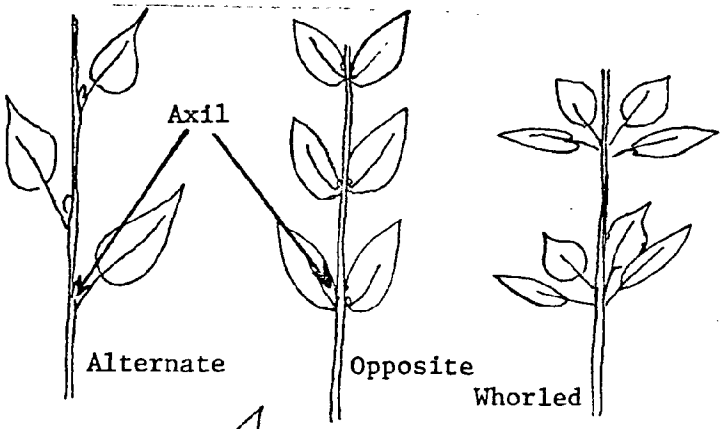
INVOLUTE: Rolled inward, in reference to leaves, the margins of which may be in-rolled.

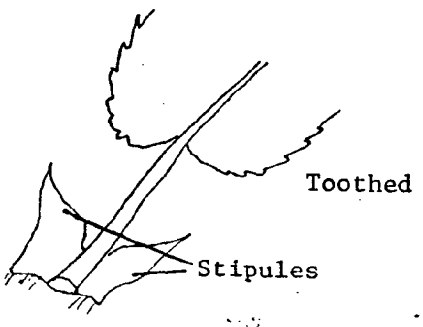


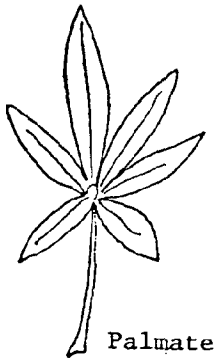
KEELED: Self-descriptive, with a longitudinal ridge of tissue on the back, usually in reference to anyone of a large variety of floral or fruit structures.

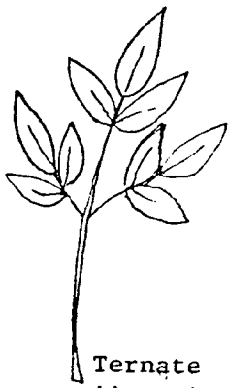
LEAF: Self-explanatory, but with a number of variations in shape, structure and arrangement that are represented below:

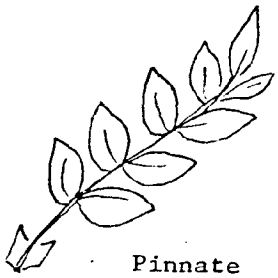


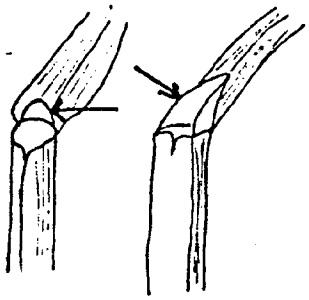












LIGULE: A small collar of waxy, leafy, or papery tissue at the summit of the leaf sheath in the leaf axils of all grasses and some sedges.

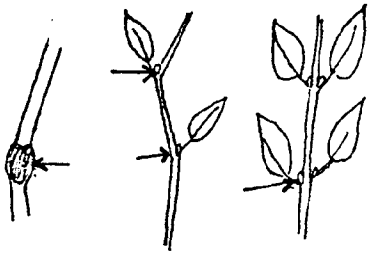
LONGITUDINAL: Along the length of.

MARGIN: The perimeter of a leaf. See leaf.

MEMBRANACEOUS, MEMBRANEOUS: Very thin, like wax paper or translucent plastic wrap.

MHW: Mean high water, the height of the annual average high tide.

MIDRIB: See leaf.



NODE: The hard, thickened swellings on the stems of grasses and rushes, or the point at which leaves occur on the stems of non-grassy plants. The area between nodes is called the internode.

OBLIQUE: At an angle.

OBLONG: Self-descriptive, usually in reference to the outline of a leaf.

OPPOSITE: See leaf.

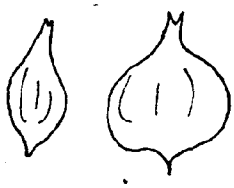
OVARY: See flower, that part of a flower which develops into the fruit; the seeds develop within the ovary.

OVOID: Oval in outline, usually in reference to leaves.

PETAL: See flower.

PETIOLE: See leaf.

PENDANT: Hanging, as in the heads of Carex paleacea.



PERIGYNIUM: A small papery sac enclosing the flowers and fruits of the genus Carex.

PERENNIAL: Persisting year after year and producing flowers and fruits each season, as opposed to annual or biennial.

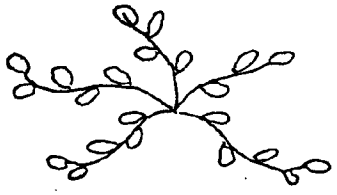
PINNATELY COMPOUND: See leaf.

PISTIL: See flower.

PISTILLATE: Bearing pistils. Usually referring to female flowers.

PITH: The core of a stem. The pith may be hollow as in most grasses or solid (often filled with spongy material).

PLANOCONVEX: In reference to the cross sectional outline of a fruit. Flat on one side curved on the other.



PROCUMBENT, PROSTRATE: Lying flat.

RADIAL: Along the radius, or branching and spreading out from a central point.

2-RANKED: A particular type of leaf arrangement. The leaves may be alternate or opposite but in either case by looking down the stem vertically there will appear to be a perfectly aligned column of leaves on each of the opposite sides of the stem.

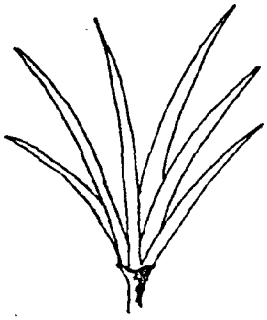
3-RANKED: As above but occurring only in situations where the leaves are alternate. Looking down the stem there appear to be 3 well aligned columns of leaves. This arrangement is frequent in the sedge family.

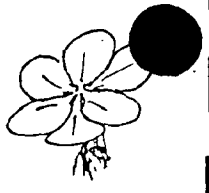
REPENT: Lying flat, creeping.

REVOLUTE: Rolled backward, in reference to the margins of some leaves.

RHIZOME: An underground stem, appearing like a root, usually with roots at the nodes. Rhizomes are typically horizontal although they may occur at varying depths.

ROSETTE: Usually in reference to an arrangement of leaves to where a cluster of leaves spread out from the center like spokes of a wheel. On most plants with basal leaves, the leaves are arranged in this fashion.





SEPALS: See flower.

SESSILE: Lacking a stem or petiole, flowers or leaves that are borne directly on the main axis of a plant are said to be sessile. See leaf.

SHEATH: See leaf.

SIMPLE: Unbranched.

SPEARHEAD-SHAPED: Self-descriptive.

SPRAWLING: Self-descriptive.

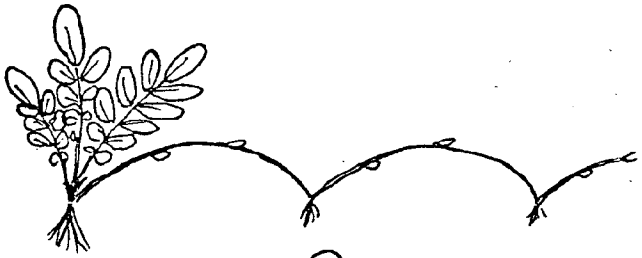
STAMEN: See flower.

STAMINATE: Bearing stamens, usually used to describe male flowers when the two sexes produce different types of flowers.

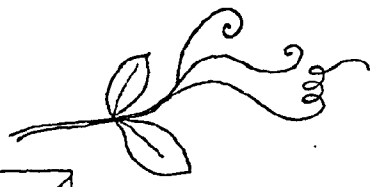
STIGMA: See flowers.

STIPULE: See leaf.

STOLON: A runner, ie. a horizontal stem that runs along the ground, often sending down roots at intervals.



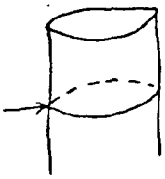
TENDRIL: A viny grasping structure that wraps around nearby objects to support the plant.



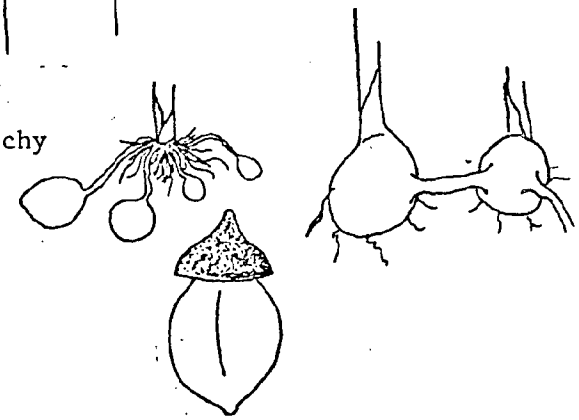
TERNATE: See leaf.

TOOTHED: Bearing teeth, see leaf.

TRANSVERSE: Across the diameter of a structure.



TUBER: An underground root structure, ranging from a small swelling to an almost potato-like starchy growth.



TUBERCLE: A small hatlike structure sitting atop the seed of some members of the sedge family. It is usually of a different texture than the seed.

WHORLED: See leaf.

X-SECTION: See cross-section.

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Potentilla anserina
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Cakile edentula
Lathyrus japonicus
Hudsonia tomentosa
Lechea maritima
Ligusticum scothicum
Samolus parviflorus
Glaux maritima
Limonium nashii
Mertensia maritima
Gerardia maritima
Plantago juncoides
Artemisia stelleriana
Aster novi-belgii
Iva frutescens
Solidago sempervirens
Xanthium echinatum