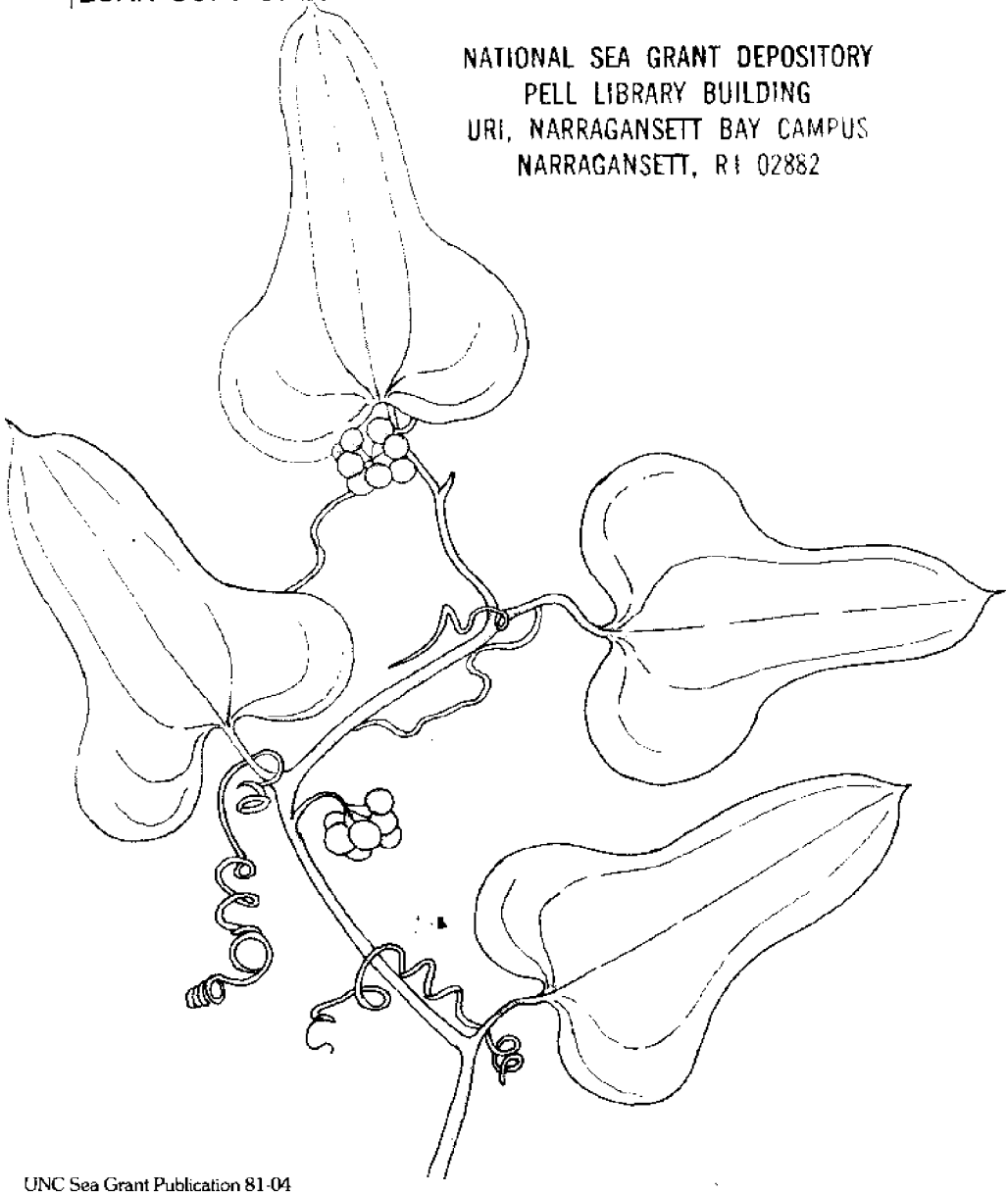
A Guide to Salt Marsh Plants Common to North Carolina



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A Guide to

Salt Marsh Plants Common to North Carolina

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the salt marsh habitat

Salt marshes act as a meeting place between the land and the sea. Marshes, extending hundreds of miles along coastal North Carolina, range throughout the intertidal areas of estuaries, creeks and rivers where the water is salty.

Salt marshes form when land vegetation invades shallow water. Vegetation grows in areas that are exposed during low tides. Silt, clay and organic matter become trapped around plants, which gradually elevates the soil. As the elevation increases, the amount of time the soil is submerged decreases. Gradually other plant species are able to grow on the higher ground.

Special features of the habitat are:

—a constantly changing environment, due to rising and falling tides.

—a tidal cycle that changes water levels, salinity and temperature and exchanges salt water twice every 24 hours.

—marsh plants and animals that are alternately wet and dry.

—salinity that varies from high to low because of varying freshwater flow from rains and streams.

—evaporation that leaves salt residues in the soil and on the plants.

—gentle wind and wave action. Storms and boat wakes are destructive, although marsh grasses reduce some of the damaging effects.

—muddy waters due to silt and organic matter suspended in the slow-flowing water.

—slow-flowing water which often limits oxygen supply in the soil and water. Bacterial activity leaves the mud rich in hydrogen sulfide which gives the marsh its characteristic "rotten egg" odor.

the value of salt marshes

Salt marshes are more than just beautiful grass meadows that reach into intertidal areas along the coast. They are a self-maintaining ecosystem of which the importance extends beyond the boundaries of the marsh.

The amount of energy or food stored in salt marshes has been compared to wheat fields. They are described as one of the most productive natural ecosystems in the world.

Plants are the primary producers of food in the marsh as they utilize energy from the sun in their growth and reproduction. Decomposition of salt marsh grass by bacteria and fungi supplies rich nutrients to the marsh system. These nutrients may be washed out in the estuary by tidal action where they help support plankton, which forms an important part of the base for the estuarine food web. Estuaries, in turn, produce animals important to human consumption like oysters, clams, shrimp, scallops and numerous fishes.

plant characteristics

The salt marsh environment imposes limits on the kinds of plants that can survive. Few species of plants can adapt to daily variations in salinity, water depth and wind and wave action. Direct sunlight contributes to the stress by causing water loss and leaving harmful residues of salt. Plants able to tolerate high salinities are called halophytes.

Ways plants adapt to conditions in the salt marsh are:

—waxy, leathery or fleshy leaves—resist salt damage and retains moisture. Yaupon, wax myrtle, bamboo vine, marsh elder and seaside goldenrod are examples.

—inrolled or cylindrical leaves—help to minimize moisture loss by having less surface area. Leaves of cordgrass are inrolled; leaves of needlerush are cylindrical.

—succulents—store salt in succulent stem and leaf tissues. Water is retained to withstand high salt content without stress, as in glasswort and sea blite.

—salt-secreting—have special glands to remove excess salt in species such as spike grass and cordgrass.

—extensive rhizomes—collect more soil and organic matter through underground stems and roots and anchor plants like cordgrass and needlerush to the soil. This prevents severe erosion by tides and storms.

—large cells—retain air, during periods of submersion, in stems and rhizomes, especially in cordgrass and needlerush.

—rotating leaves—avoid the hottest rays of the sun to minimize water loss during the day, as in marsh pennywort.

Most salt-tolerant plants do grow well outside the saltwater environment. But in freshwater habitats or upland areas, they cannot compete successfully with other species. Remember that plants grow where they can, not always where they grow best.

zonation

Special adaptations of salt marsh plants determine where they live in the marsh. Vegetation zones are more or less distinctive due to the complex combination of environmental factors. Factors include elevation above mean water level, soil type, salinity, temperature, depth of water, period of time the plants are submerged and exposed and the tidal range of the area. The marsh may slope several feet from the supratidal to the subtidal zone.

The five marsh zones are:

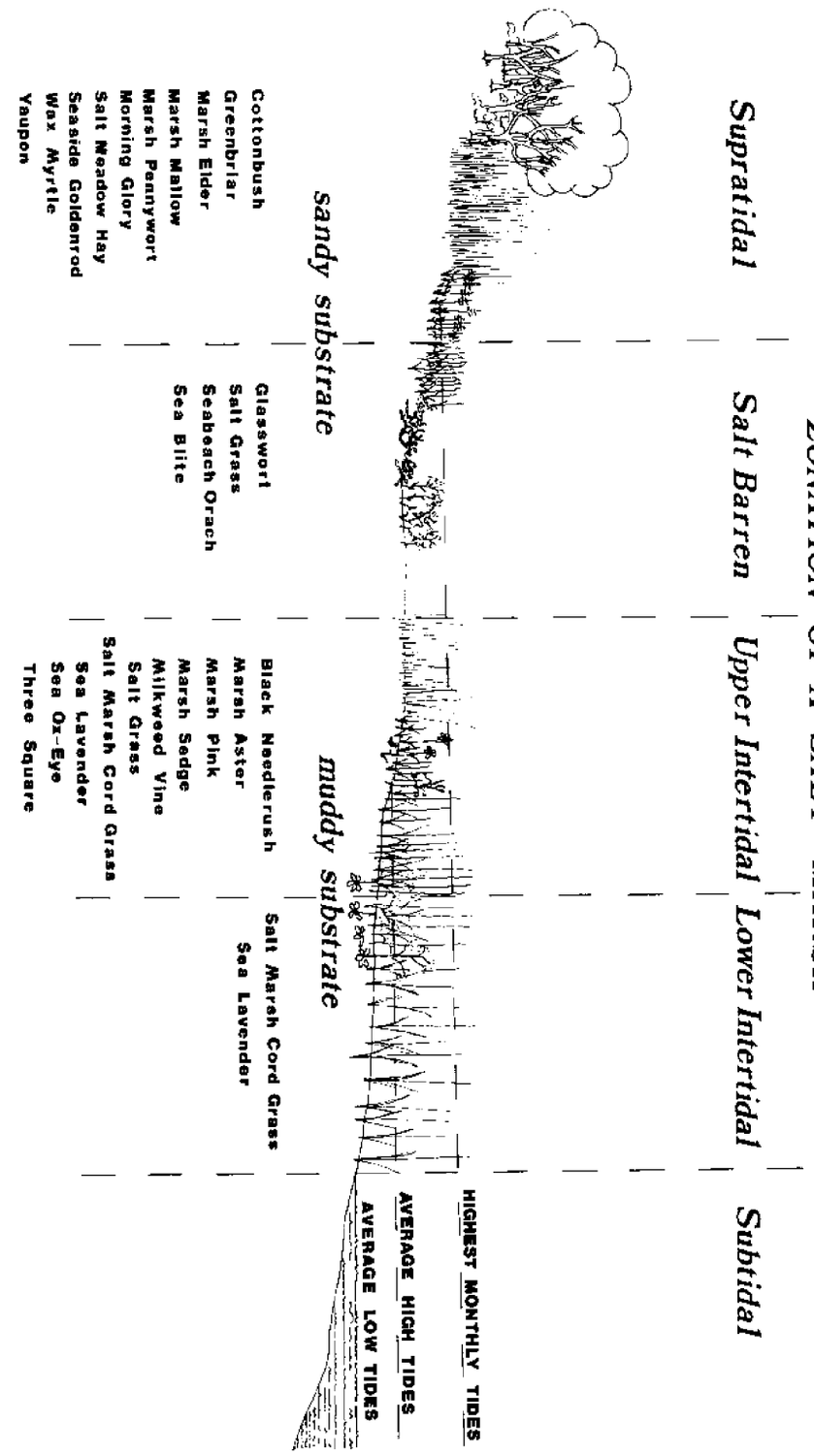
—**supratidal**—the area above the average high tide mark. Only unusually high tides and storms reach this area, although plants are exposed to salt spray. Indicator plants are wax myrtle, yaupon, marsh elder, salt-meadow hay and cottonbush.

—**salt barren**—elevated depressions infrequently inundated by salt water. The sun evaporates the water leaving a film of salt on the soil. This area is sparsely vegetated by plants that have adapted to desert-like conditions. Indicator species include succulents such as glasswort and sea blite. Spike grass, which secretes salt through glands, also grows here.

—**upper intertidal**—areas inundated with salt water during short periods of each high tide. Plants are submerged less than 50 percent of the time. Indicator species include cordgrass, needlerush and sea ox-eye.

—**lower intertidal**—a lower elevation zone where plants are submerged more than 50 percent of the time. Cordgrass is dominant, and is generally taller than in the upper intertidal zone. Nutrients are more available and there is less moisture loss.

—**subtidal**—an area submerged nearly all the time. Plants growing here include eel grass and algae.



how to use this key

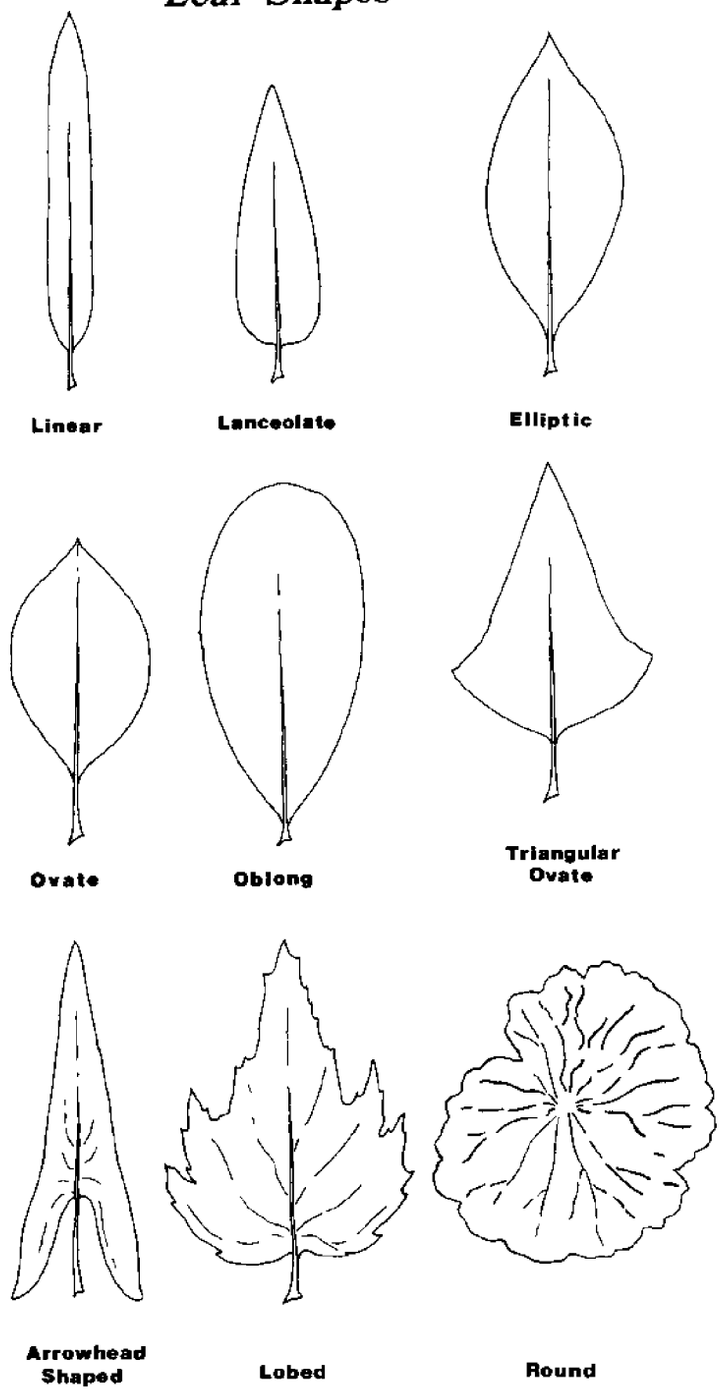
This key to common salt marsh plants is intended for layman's use. A background in botany is not necessary to use the guide. Terms used throughout the key, such as leaf shapes and leaf margins, are illustrated.

To use the key, first decide whether the plant in question is a shrub, vine, herb or grass. A general description of each plant form is given on the following pages: shrub—page 9, vine—page 13, herb—page 17, grass—page 23.

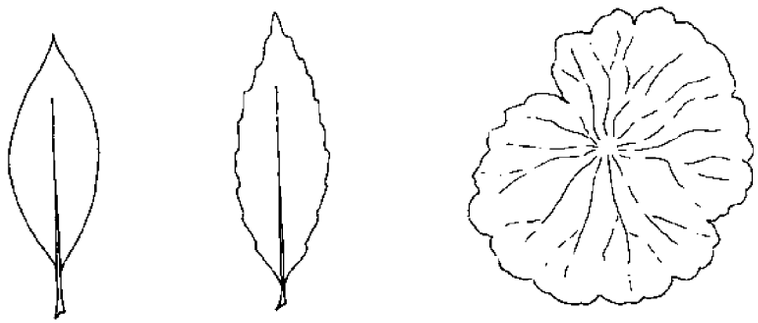
After choosing a plant form, turn the page to the simple line key. Beginning with the main heading, at each level choose one of two descriptions. Continue to work through the choices until a plant is named. When a name is reached, turn to the page with the corresponding drawing and description to determine if the identification seems correct. If it is not correct, try again.

It is possible to have a plant that is not included in the key, since only the most common plants are given. Two or three scientific names are given in some cases where species are very similar. It is beyond the scope and purpose of this key to be concerned with these differences. If you wish to go further, use the *Manual of the Flora of the Carolinas* by Radford, Ahles and Bell.

Leaf Shapes



Leaf Margins



Entire Toothed Scalloped

Leaf Arrangements

Opposite Alternate Basal Rosette

shrub

—woody
—perennial; does not die back to the ground, but persists through winter
—usually branches from the base with several main stems, not usually from a single trunk.

Shrubs

Leaves opposite on stem

Leaves dark green; fleshy with tooth margins; flowers in small cream-colored heads encased by fleshy leaves; appear to lack petals—marsh elder, *Iva frutescens* (page 11)

Leaves light green; margins often spiny; flowers in large heads with yellow petals—sea ox-eye, *Borrichia frutescens* (page 11)

Leaves alternate on stem

Leaves aromatic when crushed, yellow-green; yellow glands appear as tiny dots on the leaf surface; fruit a waxy, whitish berry—wax myrtle, *Myrica cerifera* (page 11)

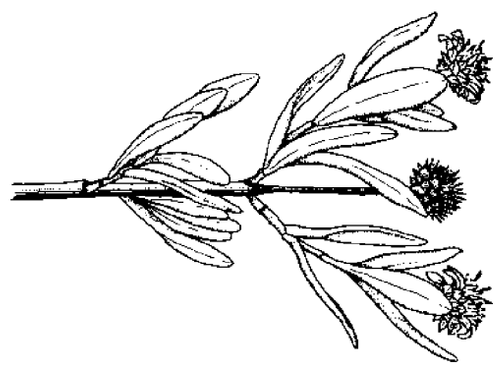
Leaves not aromatic when crushed, dark or light green

Leaves elliptic to lanceolate, light green and fleshy; margins have coarse teeth; fruiting heads appear cottony in autumn—cottonbush, groundsel tree, *Baccharis halimifolia* (page 12)

Leaves elliptic to ovate, dark green, leathery and waxy; margins have rounded teeth; fruit a red berry—yaupon, *Ilex vomitoria* (page 12)

marsh elder
Iva frutescens

—Asteraceae: Aster family
—Leaves: opposite, lanceolate to elliptic, dark green, fleshy, hairy, margins toothed
—Flowers: cream-colored heads encased by fleshy leaves
—Fruits: tiny nutlets, Aug.-Oct.
—Supratidal zone

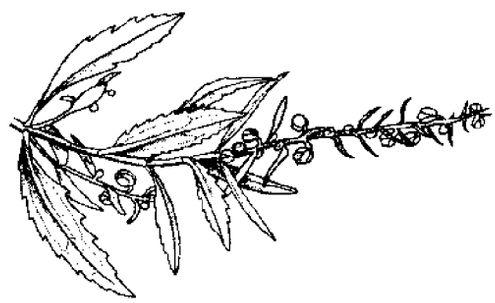


wax myrtle
Myrica cerifera

—Myricaceae: Myrtle family
—Leaves: alternate, lanceolate to elliptic, evergreen with yellow resinous glands, aromatic, margins toothed
—Flowers: tiny catkins, April
—Fruits: berry-like, waxy, Aug.-Oct.
—Supratidal zone
—Wax from berries was used in colonial times in bayberry candles. Branches were placed upon fish carts to repel flies.

sea ox-eye
Borrichia frutescens

—Asteraceae: Aster family
—Leaves: opposite, elliptic to ovate, light green, covered with grey hairs, margins often spiny
—Flowers: large yellow heads, daisy-like
—Fruits: tiny nutlets, head is spiny, May-Sept.
—Upper intertidal zone



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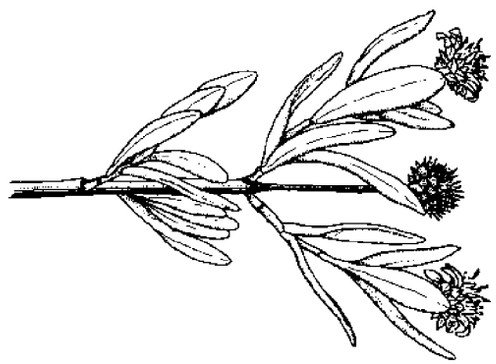
—Supratidal zone



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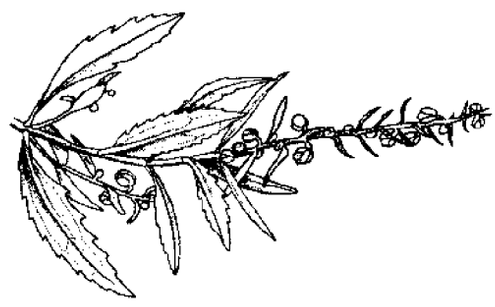


groundsel tree
cottonbush
Baccharis halimifolia

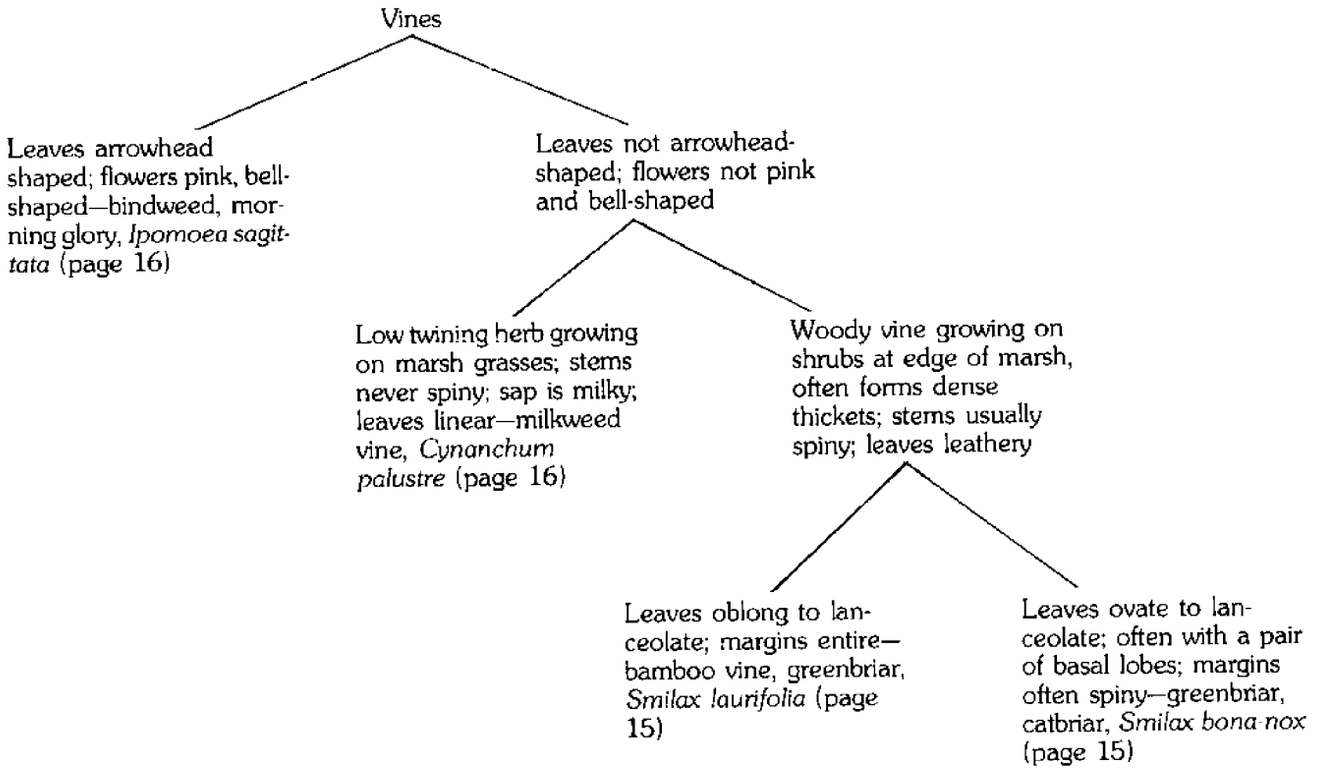
—Asteraceae: Aster family
—Leaves: alternate, ovate to elliptic, light green, margins toothed
—Flowers: heads in clusters, cream-colored
—Fruits: tiny nutlets attached to white hairs giving a cottony appearance, Sept.-Oct.
—Supratidal zone

yaupon
Ilex vomitoria

—Aquifoliaceae: Holly family
—Leaves: alternate, ovate to elliptic, dark green, waxy, margins with rounded teeth
—Flowers: tiny white, four petals, male and female flowers on separate plants, March-May
—Fruits: red berries, Oct.-Dec.
—Supratidal zone
—Tea was made from the leaves in colonial days. A stronger drink was used by Indians as a purgative during religious ceremonies.

vine

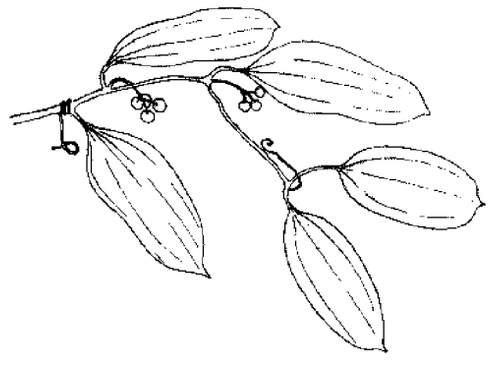
—trails along ground or climbs on other plants by tendrils
—may be woody or herbaceous



bamboo vine, greenbriar

Smilax laurifolia

—Liliaceae: Lily family
—Stems: green, spiny
—Leaves: evergreen, leathery, oblong to lanceolate
—Flowers: tiny green, three petals, in umbels, July-Aug.
—Fruits: berries bluish-black, Sept.-Oct.
—Woody high-climbing vine, dense thickets in supratidal zone
—Young shoots may be eaten in salads or cooked like asparagus



catbriar, greenbriar

Smilax bona-nox

—Liliaceae: Lily family
—Stems: green, spiny
—Leaves: evergreen, leathery, ovate to lanceolate, often with basal lobes, margins often spiny, usually mottled
—Flowers: tiny green, three petals, in umbels, April-May
—Fruits: berries bluish-black, Sept.-Nov.
—Woody low-climbing vine, dense thickets in supratidal zone
—Young shoots may be eaten in salads or cooked like asparagus

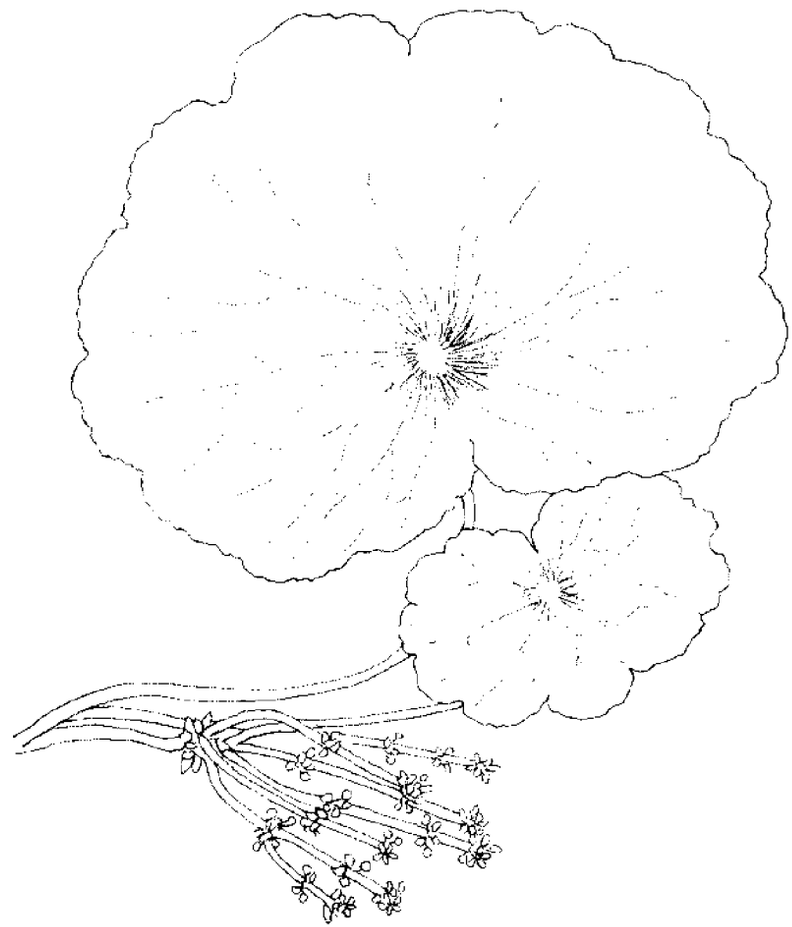
bindweed, morning glory
Ipomoea sagittata

—Convolvulaceae: Morning glory family
—Leaves: arrowhead-shaped
—Flowers: pink, bell-shaped
—Fruit: capsule, July-Sept.
—Trails over ground in supratidal zone

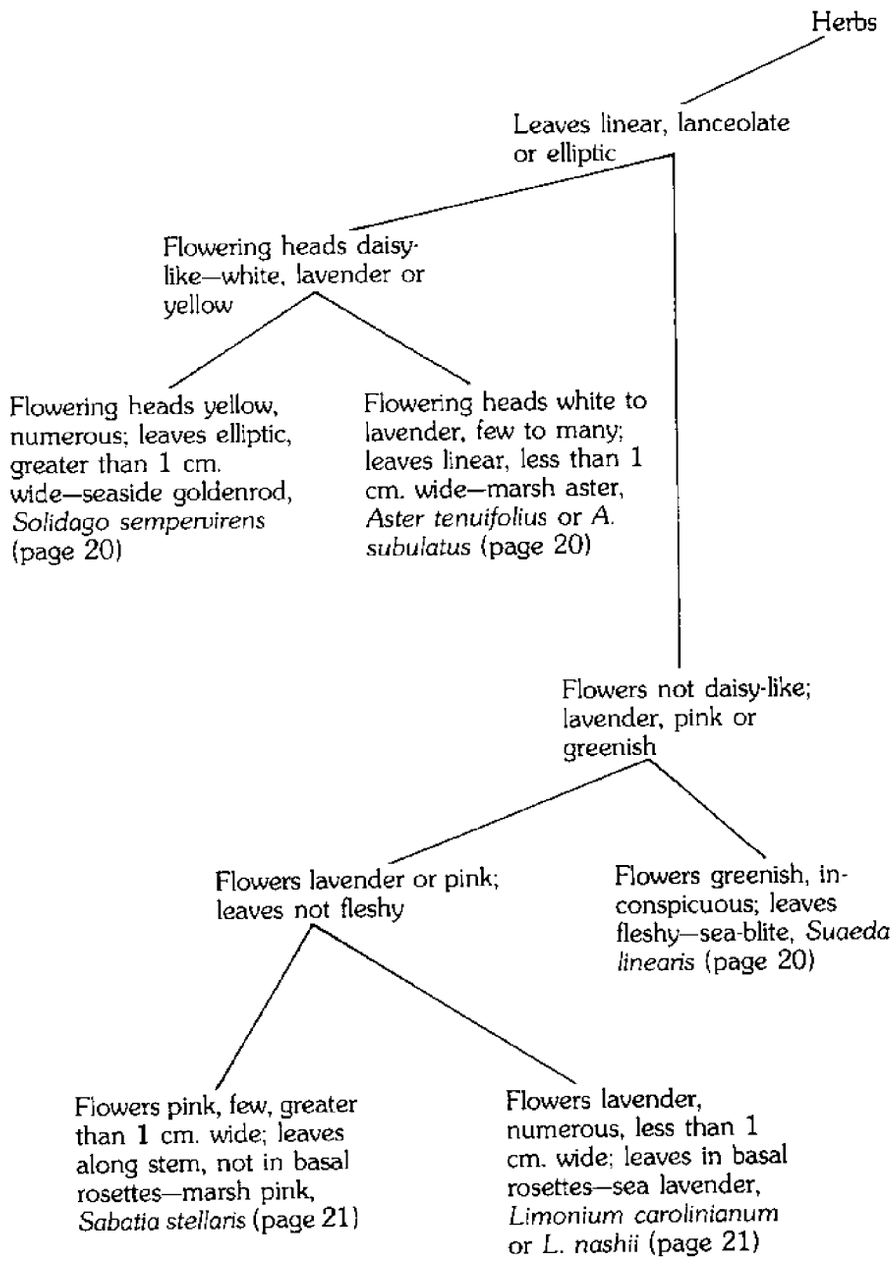
milkweed vine
Cynanchum palustre

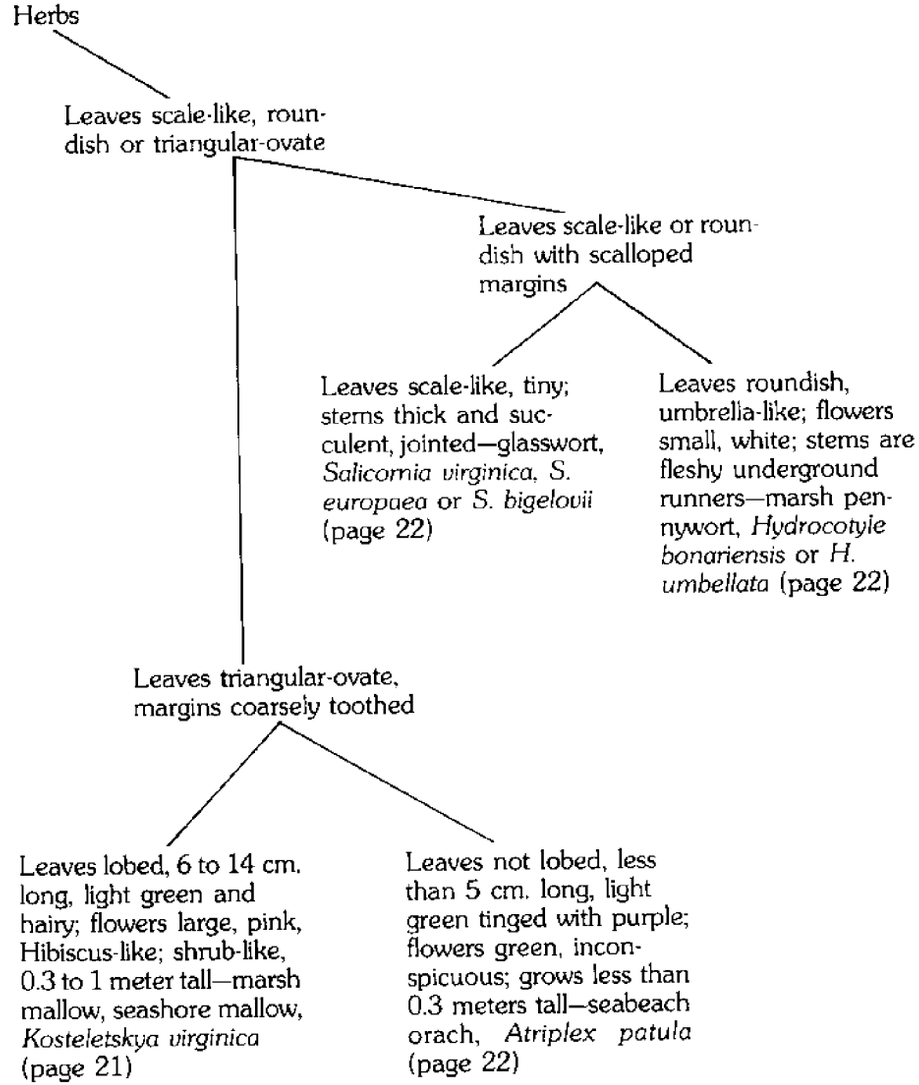
—Asclepiadaceae: Milkweed family
—Stems: herbaceous with milky sap
—Leaves: opposite, linear
—Flowers: greenish tinged with rose, five petals, in umbels, June-July
—Fruits: pods slender, seeds attached to silky white hairs, July-Oct.
—Upper intertidal to supratidal zone

herb



—herbaceous; lacks a persistent woody stem; dies back in winter
—may be perennial; dies back to roots, rhizomes or bulbs
—may be annual; entire plant dies after one growing season; propagates only by seed


Herbs
Leaves linear, lanceolate or elliptic
Flowering heads daisy-like—white, lavender or yellow
Flowering heads yellow, numerous; leaves elliptic, greater than 1 cm. wide—seaside goldenrod, *Solidago sempervirens* (page 20)
Flowering heads white to lavender, few to many; leaves linear, less than 1 cm. wide—marsh aster, *Aster tenuifolius* or *A. subulatus* (page 20)
Flowers not daisy-like; lavender, pink or greenish
Flowers lavender or pink; leaves not fleshy
Flowers greenish, inconspicuous; leaves fleshy—sea-blite, *Suaeda linearis* (page 20)
Flowers pink, few, greater than 1 cm. wide; leaves along stem, not in basal rosettes—marsh pink, *Sabatia stellaris* (page 21)
Flowers lavender, numerous, less than 1 cm. wide; leaves in basal rosettes—sea lavender, *Limonium carolinianum* or *L. nashii* (page 21)


Herbs
Leaves scale-like, roundish or triangular-ovate
Leaves scale-like or roundish with scalloped margins
Leaves scale-like, tiny; stems thick and succulent, jointed—glasswort, *Salicornia virginica*, *S. europaea* or *S. bigelovii* (page 22)
Leaves roundish, umbrella-like; flowers small, white; stems are fleshy underground runners—marsh pennywort, *Hydrocotyle bonariensis* or *H. umbellata* (page 22)
Leaves triangular-ovate, margins coarsely toothed
Leaves lobed, 6 to 14 cm. long, light green and hairy; flowers large, pink, Hibiscus-like; shrub-like, 0.3 to 1 meter tall—marsh mallow, seashore mallow, *Kosteletskya virginica* (page 21)
Leaves not lobed, less than 5 cm. long, light green tinged with purple; flowers green, inconspicuous; grows less than 0.3 meters tall—seabeach orach, *Atriplex patula* (page 22)

seaside goldenrod
Solidago sempervirens

—Asteraceae: Aster family
—Perennial
—Leaves: elliptic to lanceolate, fleshy, basal, margins toothed, along stem
—Flowers: heads yellow, daisy-like, arranged in rows
—Fruits: tiny nutlets attached to white hairs, Aug.-Nov.
—Supratidal zone
—A herbal tea is made from the leaves and flowers

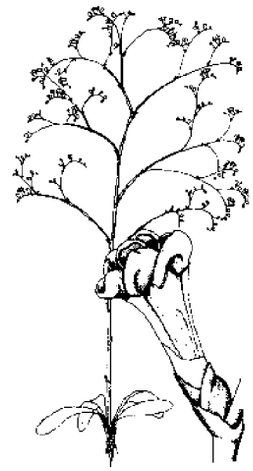
marsh aster
Aster tenuifolius, A. subulatus

—Asteraceae: Aster family
—Annual or perennial
—Leaves: linear, fleshy
—Flowers: heads daisy-like, white or lavender with pale yellow centers, few to many
—Fruits: tiny nutlets attached to white hairs, Sept.-Nov.
—Upper intertidal zone

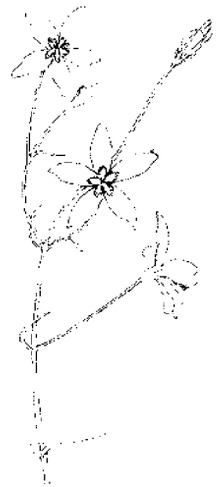
sea-blite
Suaeda linearis

—Chenopodiaceae: Goosefoot family
—Leaves: alternate, linear, dull green to whitish
—Flowers: green, inconspicuous
—Fruits: nutlet-like, Aug.-frost
—Upper intertidal zone and salt barrens
—Succulent leaves may be eaten raw in salads

sea lavender
Limonium carolinianum, L. nashii



—Plumbaginaceae: Sea lavender family
—Leaves: elliptic, fleshy, basal rosettes
—Flowers: small, lavender, five petals, arranged in fan-shaped inflorescence
—Fruits: nutlet-like, Aug.-Oct.
—Upper intertidal zone



marsh pink
Sabatia stellaris

—Gentianaceae: Gentian family
—Stems: Cylindrical or four-sided
—Annual
—Leaves: opposite, lanceolate to elliptic
—Flowers: large, showy, pink with yellow centers, five petals
—Fruit: capsule, July-Aug.
—Upper intertidal zone

seashore mallow, marsh mallow
Kosteletskya virginica

—Malvaceae: Hibiscus family
—Perennial, shrub-like to 1 meter tall
—Leaves: large, triangular-ovate, often lobed, hairy
—Flowers: large, pink, five petals, stamens very prominent
—Fruits: capsule, July-Aug.
—Supertidal zone
—Original "marsh mellow" was made from the roots. Young leaves may be added to thicken stews.

seabeach orach
Atriplex patula

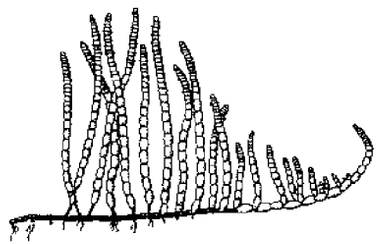
—Chenopodiaceae: Goosefoot family
—Leaves: triangular-ovate, fleshy, light green tinged with purple, margins toothed; lower leaves opposite, upper leaves alternate
—Flowers: green, inconspicuous
—Fruits: nutlet-like, July-frost
—Supratidal to upper intertidal zones, salt barrens

glasswort
Salicornia virginica, S. europaea. S. bigelovii

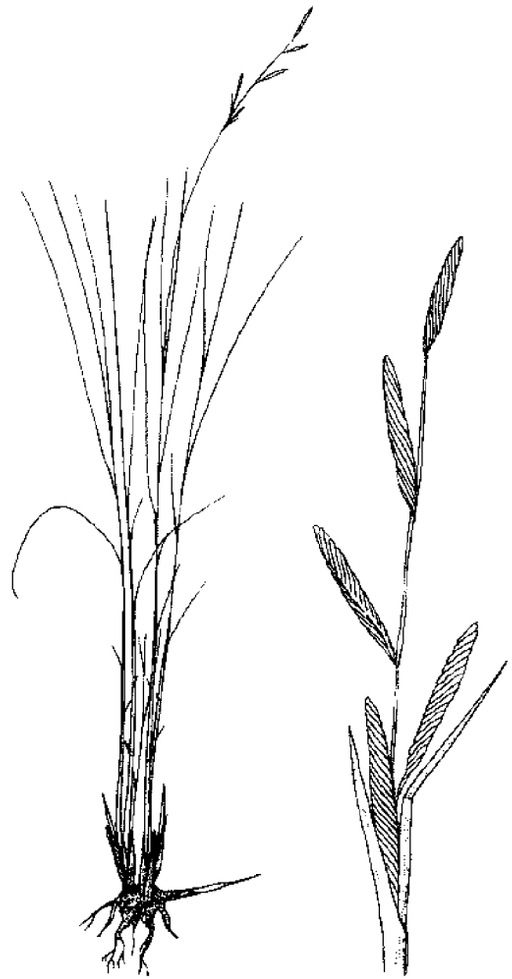
—Chenopodiaceae: Goosefoot family
—Stems: thick, succulent, jointed, cactus-like, may turn pink in autumn
—Leaves: small, scale-like, opposite
—Flowers: green, inconspicuous
—Fruits: nutlet-like, July-Oct.
—May form mats in upper intertidal zone or salt barrens
—Succulent stems may be eaten in salads

marsh pennywort
Hydrocotyle bonariensis, H. umbellata

—Apiaceae: Carrot family
—Stems: underground white rhizomes
—Leaves: roundish, umbrella-like with petiole attached to center, margins scalloped
—Flowers: small, white, arranged in umbels
—Fruits: nutlet-like, similar to caraway or dill seeds, April-Sept.
—Grows low to ground, often forms mats in supratidal zone
—Leaves change orientation during the day to avoid the hottest rays of the sun



grass



—grasses fall into three distinct families: true grasses, sedges and rushes
—leaves are usually linear and often rolled inward.
—flowers and fruits are small and parts are inconspicuous

Stems cylindrical, rolls easily between your fingers; flowers in spikelets or flowers with six brown petal-like scales

Stems triangular-shaped, does not roll easily between your fingers; flowering and fruiting spikelets large, rounded, ovoid and scaly

Leaves flat or rolled inward, not cylindrical; flowers in spikelets; fruits tiny grains, similar to rice

Leaves stem-like, cylindrical, rolls easily between your fingers; leaves stiff, sharp, spine-tipped; flowers with six brown petal-like scales; fruits tiny brown capsules—black needlerush, *Juncus roemerianus* (page 25)

Grow in water, forming dense colonies; leaf blades coarse, flat 4 to 12 mm. wide; margins have tiny sharp teeth near tip—salt marsh cord grass, saltwater cord grass, *Spartina alterniflora* (page 25)

Do not grow in water; may form dense colonies; leaf blades narrow, rolled inward, 1 to 6 mm. wide; margins have tiny sharp teeth or are smooth

Inflorescence appears to occur along side of stem in dense cluster; bracts extend beyond inflorescence; grows 0.6 to 1.3 meters tall—three square, *Scirpus robustus* (page 27)

Inflorescence occurs at end of stem in loose cluster; bracts do not usually extend beyond inflorescence; grows 0.3 to 1 meter tall—marsh sedge, *Fimbristylis spadicea* (page 27)

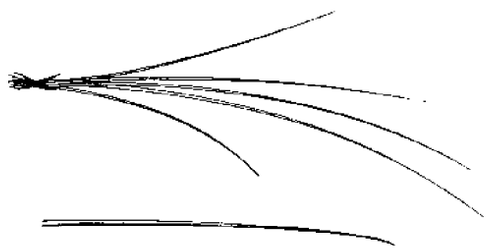
Less than 0.5 meter tall; leaves arranged along opposite sides of stem; leaf blades flat or rolled inward; spikelets green, tightly arranged—salt or spike grass, *Distichlis spicata* (page 26)

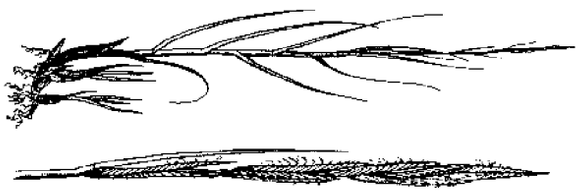
Greater than 0.5 meter tall; leaves loosely arranged around stem, few in number, usually more than ½ length of stem; leaf blades roll inward; spikelets purplish, loosely arranged—salt-meadow hay, *Spartina patens* (page 26)

black needlerush

Juncus roemerianus

—Juncaceae: Rush family
—Stems: underground rhizomes
—Leaves: stem-like, cylindrical, stiff, spine-tipped, grey-green
—Flowers: clusters of six-petaled, brown, scale-like flowers appear 15 cm. from tip of leaf
—Fruits: tiny brown capsules, May-Oct.
—Grows in dense stands in upper intertidal zone
—The sharp needles were used as sewing needles during colonial times





salt marsh cord grass
saltwater cord grass

Spartina alterniflora

—Poaceae: True grass family
—Stems: cylindrical, hollow, jointed, extensive rhizomes in mud
—Leaves: linear, flat, 4 to 12 mm. wide, margins with tiny sharp teeth near tip
—Flowers: tiny scale-like florets in spikelets, ascending
—Fruits: tiny grains, rice-like, June-Sept.
—Resembles a field of grain; most important plant in intertidal zone; plants often stunted in upper intertidal zone
—Coastal Indians wove mats and baskets with this plant

salt-meadow hay
Spartina patens

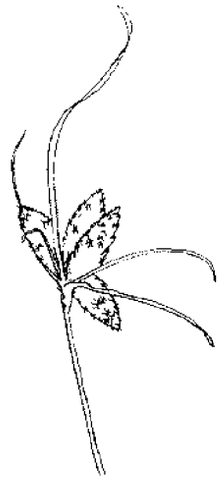
—Poaceae: True grass family
—Stems: cylindrical, hollow, jointed, rhizomes in sand
—Leaves: linear, rolled inward, 1 to 6 mm. wide, margins may have tiny sharp teeth near tip
—Flowers: tiny scale-like florets in spikelets, ascending, purplish
—Fruits: tiny grains, June-Sept.
—Similar to salt marsh cord grass, but more narrow and delicate
—Supratidal to upper intertidal zone
—Harvested for cattle feed during colonial times

salt or spike grass
Distichlis spicata

—Poaceae: True grass family
—Stems: cylindrical, hollow, jointed, rhizomes in sand, less than 0.5 meter tall
—Leaves: linear, flat or rolled inward, along opposite sides of stem, flat in one plane, margins smooth
—Flowers: dense clusters of green spikelets
—Druits: grains, June-Oct.
—Forms mats in supratidal, upper intertidal or salt barren zone

marsh sedge
Fimbristylis spadicea

Cyperaceae: Sedge family
—Stems: triangular
—Leaves: basal, linear, usually rolled inward
—Flowers: oval spikelets, scale-like, in loose clusters
—Fruits: tiny brown nutlets, two-sided, July-Sept.
—Supratidal to upper intertidal zone



three square
Scirpus robustus

—Cyperaceae: Sedge family
—Stems: triangular, sharply angled
—Leaves: along stem, rolled inward
—Flowers: oval to cylindrical spikelets, scale-like, dense clusters below tip of leaf
—Fruits: brown nutlets, two-sided, July-Sept.
—Supratidal to upper intertidal zone

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