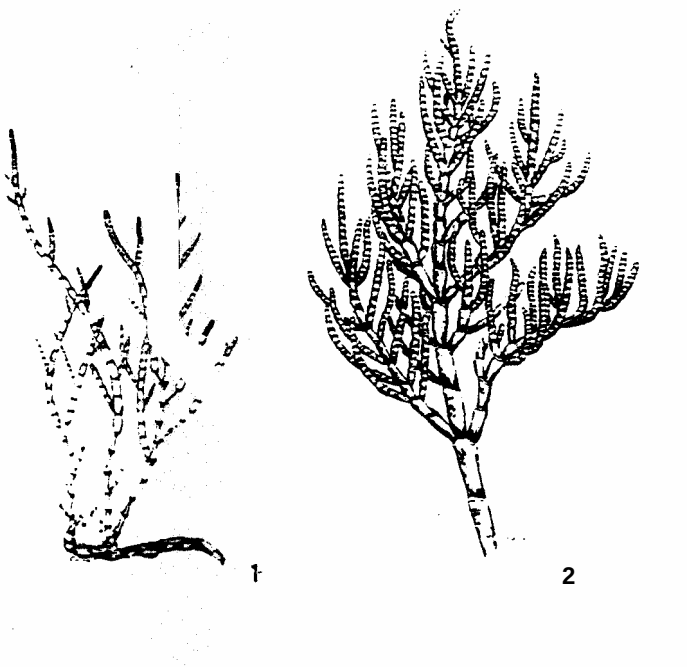
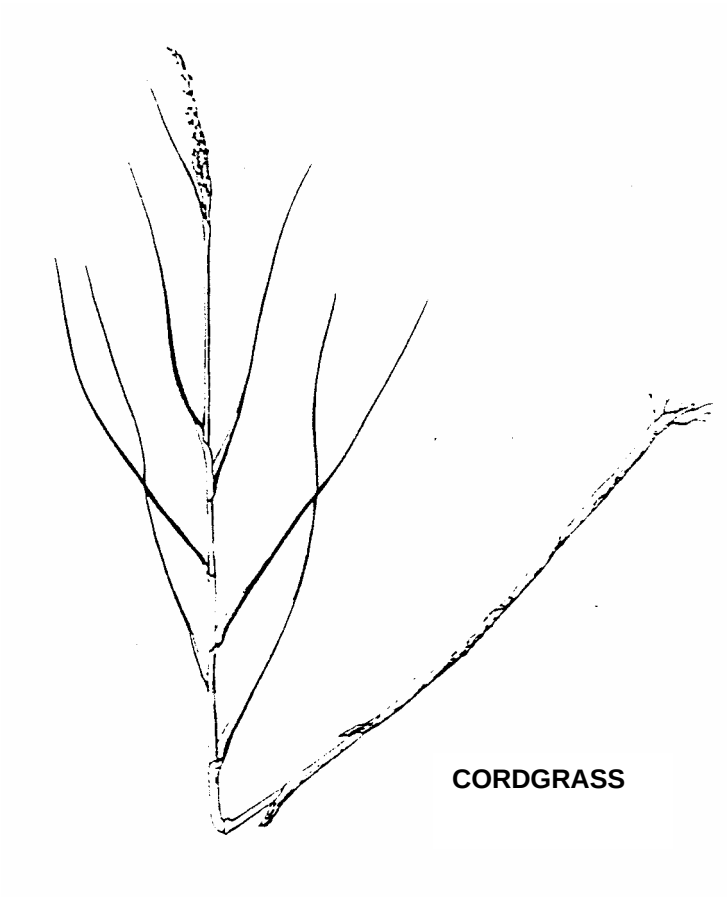
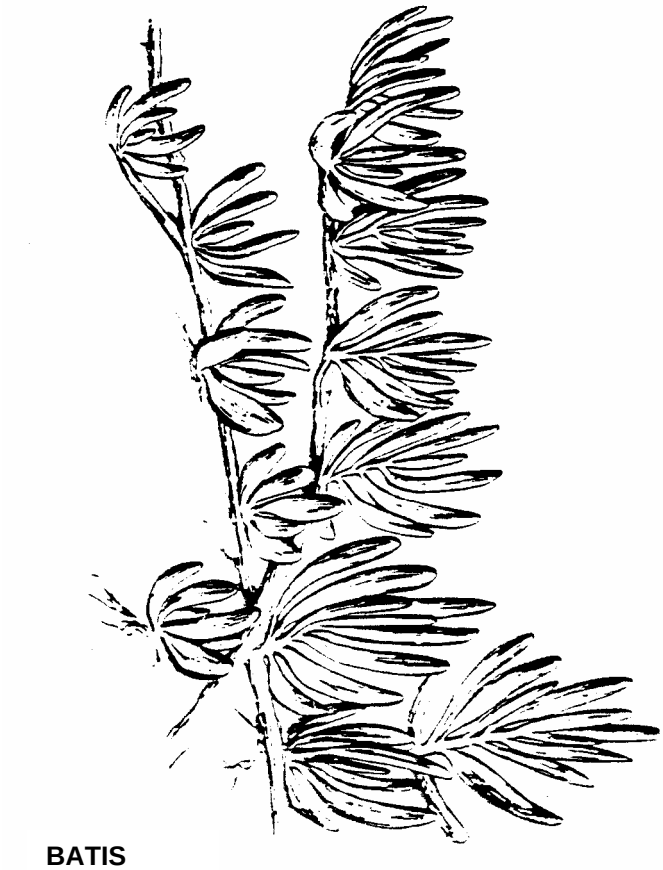


PICKLEWEED **GLASSWORT**



CORDGRASS

JAUMEA



BATIS

CORDGRASS Grass Family
Spartina foliosa

HABITAT: Growns in the low marsh where the roots are continually bathed in ocean water.

APPEARANCE: Look for a tall grass which is higher than the other plants in the salt marsh.

REPRODUCTION: All grasses are wind pollinated. Look for straw colored spikes of densely packed flowers. Male flowers will have pollen and the female flowers will show graceful waving stigmas to catch the pollen.

ADAPTATION TO SALT: All the salt marsh grasses are **salt excreters** using special pores to push out droplets of salty water. Look on the grass blades for salt crystals. See sea lavender.

ECOLOGICAL RELATIONSHIPS: Home for the endangered bird, the Light-footed Clapper Rail. A spider lives its whole life inside the blades. Important food for grazing animals.

PICKLEWEED Amaranth Family
3 kinds, 2 examples
Pickleweed Sarcocornia pacifica [1]
Glasswort Arthrocnemum subterminalis [2]

HABITAT: Found throughout the salt marsh.

APPEARANCE: Stems look like a chain of small pickles.

REPRODUCTION: The flowers of all pickleweeds are pollinated by the wind. The small flowers are hard to see because they have no colorful petals

ADAPTATION TO SALT: Pickleweeds are some of the many marsh plants that use salt **storage** (they are **accumulators**). Also called **succulents**, these plants are swollen with the stored salty water. When the salt concentration becomes too high the cells will die.

ECOLOGICAL RELATIONSHIPS: Frequently the most common plants in the marsh, they provide shelter and food for invertebrates. Belding's Savannah Sparrows build their nests in the glasswort.

BATIS or SALTWORT Saltwort Family
Batis maritima

HABITAT: Most frequently found in the low marsh. It grows with cordgrass and pickleweed.

APPEARANCE: Look for bunches of succulent leaves attached to creeping stems. The leaves retain their yellow-green color all year.

REPRODUCTION: This plant is pollinated by the wind like its neighbor pickleweed. The fruits look like a small bumpy potato.

ADAPTATION TO SALT: This plant is a succulent; it stores and dilutes salt within special cells. The leaves drop off when the cells are too full of salt. See pickleweed.

ECOLOGICAL RELATIONSHIPS: In late summer thousands of the bright green fruits can be found with other debris left at the high tide line. This plant finds new places to grow by floating with the tide.

JAUMEA Sunflower Family
Jaumea carnosa

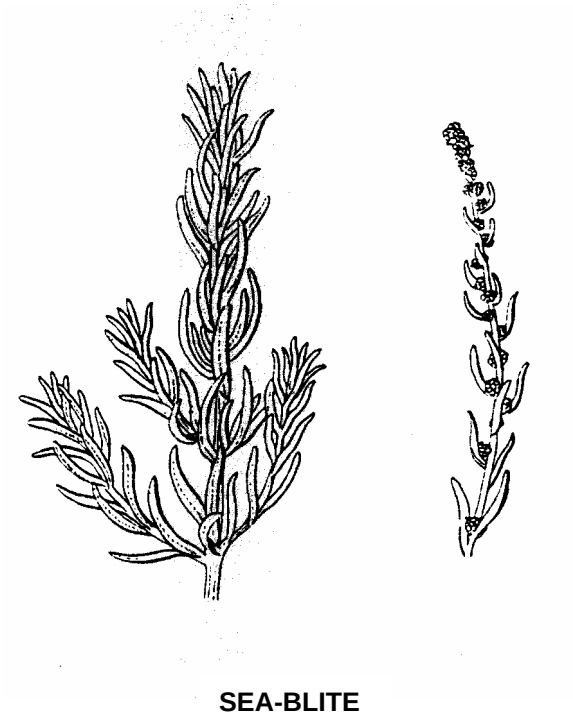
HABITAT: Found growing in the middle marsh where fewer high tides reach out but where the salt collects in the summer.

APPEARANCE: Jaumea has smaller-than-a-dime yellow sunflowers. The leaves are flat and succulent.

REPRODUCTION: The flowers are insect pollinated. The plants bloom in the summer.

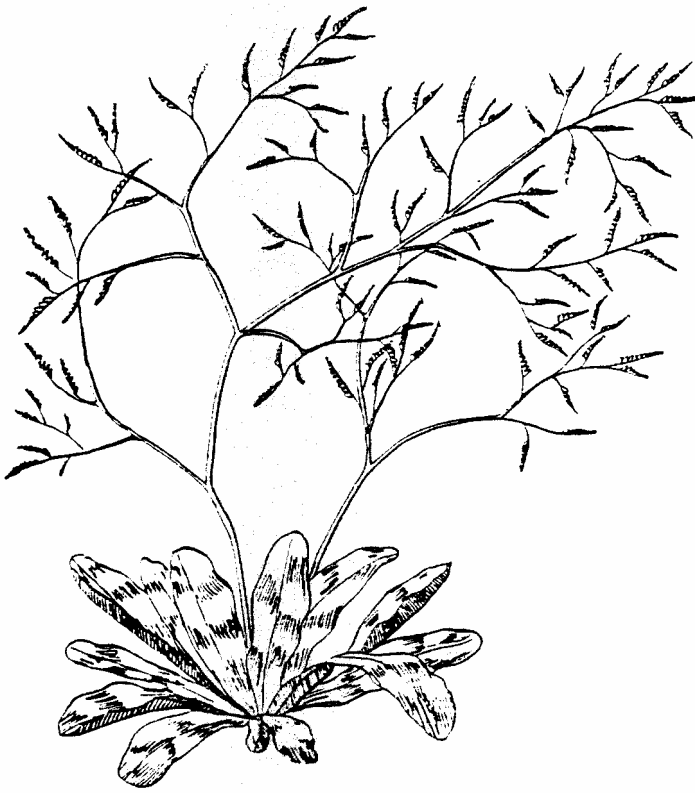
ADAPTATION TO SALT: The swollen leaves show it is succulent. See pickleweed and batis.

ECOLOGICAL RELATIONSHIPS: One of the few plants in the salt marsh which provides nectar and pollen for insects.

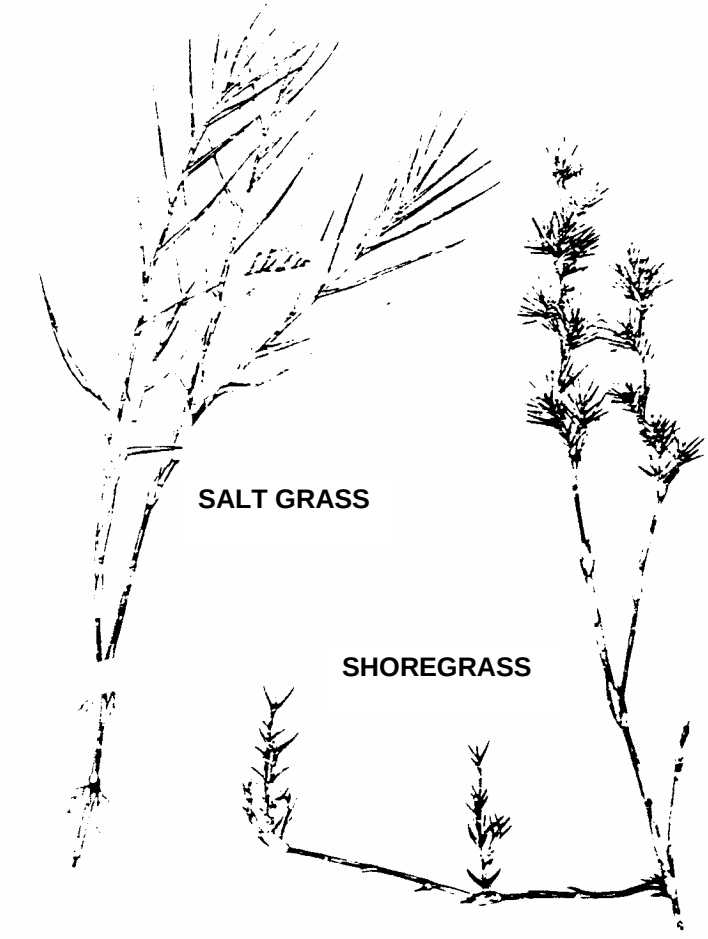


SEA-BLITE

ALKALI HEATH



SEA LAVENDER



SALT GRASS

SHOREGRASS

ALKALI HEATH Frankenia Family
Frankenia salina

HABITAT: Found in the high marsh. Also found inland in wet salty areas.

APPEARANCE: A small shrubby plant with small pink flowers. The leaves are small and flat. Sometimes the edges are rolled under which gives the leaves a needle shape.

REPRODUCTION: The pink flowers are insect pollinated. The plant blooms in the summer.

ADAPTATION TO SALT: Alkali heath excretes or pumps out salt through glands on the leaf. Look for salt crystals. See sea lavender.

ECOLOGICAL RELATIONSHIPS: Produces nectar for insects; provides shade and a place to hide for invertebrates.

SUAEDA or SEA-BLITE Amaranth Family
Suaeda esteroa

HABITAT: Found in the high marsh. Grows with glasswort and shoregrass, as wells as other common high marsh plants.

APPEARANCE: Look for a shrubby bush with dense, blue-green, succulent leaves. Small flowers tucked into leaf axils. Usually they are taller than surrounding plants. See batis.

REPRODUCTION: Wind pollinated. See batis and pickleweed.

ADAPTATION TO SALT: The many succulent leaves store salt. When there is too much salt in the leaves they turn red and fall off. See pickleweed.

ECOLOGICAL RELATIONSHIPS: One of the nine species of plants which make up the thick growth in the upper marsh. Birds, mammals (mice, shrews), and invertebrates use this habitat for cover, nesting grazing, and hunting.

SALT GRASS Grass Family
Distichlis spicata
SHOREGRASS
Monanthochloe littoralis

HABITAT:
Salt grass grows over a wide area -- from the middle salt marsh to many wet, salty places inland. Shoregrass will be found in the high marsh, where the highest concentrations of salt can be found in the summer months.

APPEARANCE:
Salt grass has a single row of leaves on opposite sides of the main stem.
Shoregrass has short tufts of leaves marching up the stem. Put your hands on shoregrass and feel the prickle from the sharp leaf tips.

ADAPTATION TO SALT: All the salt marsh grasses are **salt excreters.** Look for salt crystals on the leaves.

ECOLOGICAL RELATIONSHIPS: Both grasses produce seeds for birds and mammals. The endangered butterfly, the wandering skipper, lays eggs on salt grass leaves.

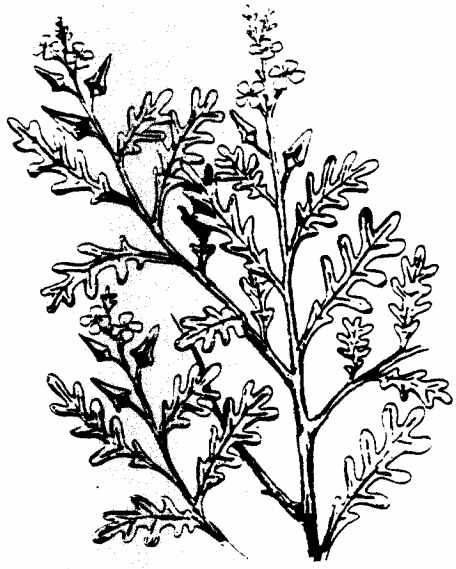
SEA LAVENDER or Leadwort Family
MARSH ROSEMARY
Limonium californicum

HABITAT: Found in middle and high marsh. Frequently seen with glasswort and shoregrass.

APPEARANCE: Look for a tall branching flowering stalk above a base of many long leaves. The small flowers are blue and white. Blooms in late summer.

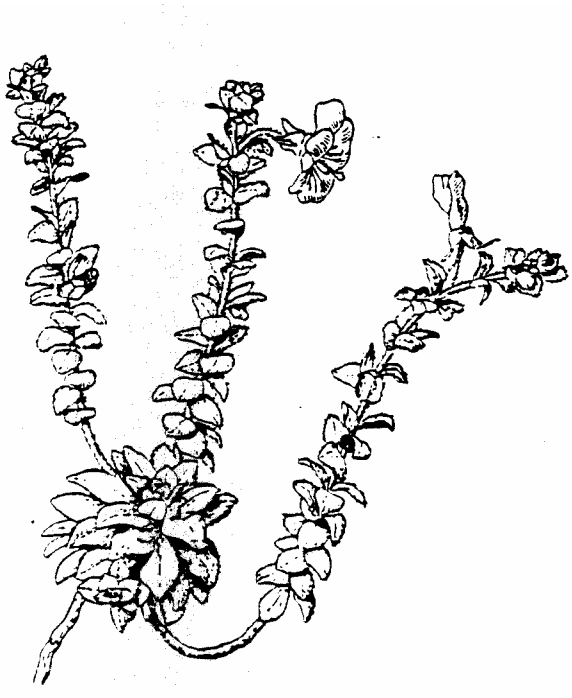
ADAPTATION TO SALT: This is one of the **salt excreters** - look for crystals of salt on the leaf surface. Salty water is pumped out of the leaf through special pores, the sun evaporates the water and salt crystals remain behind.

ECOLOGICAL RELATIONSHIPS: Flowers are a late summer nectar source for certain insects. On the flower stem, spiders build webs and capture prey.



SAND VERBENA

SEA ROCKET



BEACH EVENING-PRIMROSE

BEACH BURWEED

SAND VERBENA Four O'clock Family
Abronia maritima

HABITAT: This plant grows in sand dunes and can withstand direct salt spray and ocean water.

APPEARANCE: Sprawling plant with thick succulent leaves and deep pink flowers.

REPRODUCTION: Insect pollinated.

ADAPTATION TO SALT: Succulent leaves store and dilute salt in special cells.

ECOLOGICAL RELATIONSHIPS: This sprawling plant protects dunes from high storm waves and strong winds. Flowers contain nectar and pollen for insects. Small animals live under its broad mat.

SEA ROCKET Mustard Family
Cakile maritima

HABITAT: This plant grows in sand dunes and can withstand direct salt spray.

APPEARANCE: This ragged plant has tubular pale lavender flowers with 4 petals. The leaves are succulent and lobed. The dead brown stems of this annual plant last through the winter.

REPRODUCTION: Insect pollinated.

ADAPTATION TO SALT: Succulent leaves, a short life span (one growing season), and roots that grow down to fresh water help this plant live near the ocean.

ECOLOGICAL RELATIONSHIPS: This introduced **native to Europe** is a rapid colonizer. Its seeds have two parts; one part breaks off and floats with the tide, the other half of the seed stays with the mother plant and sprouts with the first rain.

BEACH BURWEED Sunflower Family
Ambrosia chamissonis

HABITAT: This plant grows in sand dunes and sandy areas but not in the direct path of salty surf spray.

APPEARANCE: This blue-green shrub had deeply lobed, hairy leaves and sprawls over the sand.

REPRODUCTION: The upright spikes of flowers are pollinated by the wind, so do not look for brightly colored sunflowers. Male flowers have pollen and female flowers are covered in spikes.

ADAPTATION TO SALT: Roots of this plant reach down for fresh water stored deep in the sand.

ECOLOGICAL RELATIONSHIPS: The spiny seeds have earned the name "Bather's Delight." The spines help the seeds to hook-on and tag-along to new locations. This plant helps hold the sand in place during storms.

BEACH EVENING PRIMROSE
Evening-Primrose Family
Camissonia cheiranthifolia

HABITAT: Grows in sand dunes and other sandy areas but not in the direct path of the salty surf spray.

APPEARANCE: Sprawling plant with brilliant, four petaled yellow flowers. Petals have one or two bright red spots.

REPRODUCTION: Insect pollinated. Perennial plant, seeds require fresh water to germinate.

ADAPTATION TO SALT: Roots of this plant reach down to fresh water.

ECOLOGICAL RELATIONSHIPS: Nectar source for insects. Helps to hold sand in place during bad weather.

ARROYO WILLOW

BLACK WILLOW

TREE TOBACCO

MULE FAT

ARROYO WILLOW Willow Family
Salix lasiolepsis

HABITAT: Arroyo willow does not like salt water. It grows where fresh water reaches its roots. Where you find willows, you are sure to find fresh water.

APPEARANCE: A low-spreading tree from 6 to 30 feet tall. The leaves are lance-shaped and several times longer than wide. They are from two to four inches long and drop off in the fall. They are smooth and dark green on top and hairy underneath. The bark is smooth and the twigs are yellowish to dark brown and usually hairy.

REPRODUCTION: Flowers are in male and female catkins. A catkin is a slender cluster of flowers. The tree is wind pollinated so there are no petals. It can grow from seeds or from pieces that fall on wet ground.

ECOLOGICAL RELATIONSHIPS: Birds nest, gather food, hide from enemies, and rest among its leaves. Insect galls grow on the leaves and stems.

BLACK WILLOW Willow Family
Salix gooddingii

HABITAT: Willows grow in wet ground. They probably bring air to their roots through small holes in the bark called lenticles.

APPEARANCE: The black willow looks like the arroyo willow, but has rough, dark bark. The leaves are grayish-green.

REPRODUCTION: Flowering catkins appear on the branch tips before the leaves. The black willow is wind pollinated. The leaves would get in the way if they came before the flowers.

ECOLOGICAL RELATIONSHIPS: Like other fresh water plants that grow on the edge of streams and marshes, roots of the black willow help to keep the bank stable and soil from washing away.

MULE FAT Sunflower Family
Baccharis salicifolia

HABITAT: This shrub is common in moist places and dry stream beds.

APPEARANCE: A shrub that grows from 6 to 12 feet high. Its leaves are 1 to 4 inches long, lance-shaped, with small teeth at the edge. The leaves remain on the plant all year long. To distinguish from willows, look for 3 long veins in the leaves.

REPRODUCTION: There are clusters of whitish flowers arranged at the tip of the branches. Seeds are carried by the wind.

ECOLOGICAL RELATIONSHIPS: Not tolerant of salt, indicator of fresh water seepage. Its name comes from the belief that mules grow fat from eating the leaves.

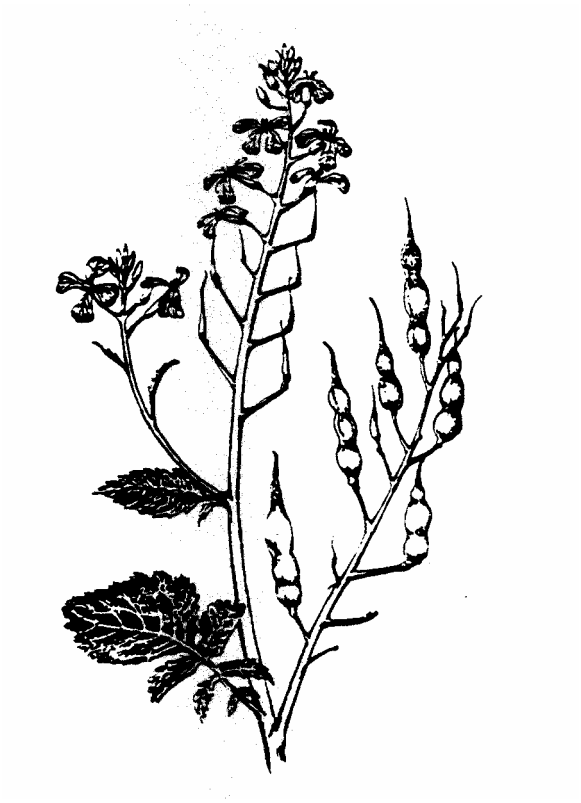
TREE TOBACCO Nightshade Family
Nicotiana glauca

HABITAT: Grows well wherever there is disturbed soil, and along stream banks that have been scoured by rushing water.

APPEARANCE: A shrub that grows from 6 to 15 feet tall. It has long, slender stems. The leaves are covered with a whitish bloom. The flowers are long, slender, yellow tubes and many grow on the end of the stems.

REPRODUCTION: Pollinated by long tongued insects and hummingbirds. Only grows from seeds.

ECOLOGICAL RELATIONSHIPS: The flower nectar is a favorite food for Anna's Hummingbird. The tube is about the same length as the bird's bill. THE NECTAR AND ALL PARTS OF THIS PLANT ARE POISONOUS TO HUMANS. The plant is full of nicotine, a powerful poison. **Native to Argentina** and introduced to California from Mexico during the Spanish Mission Period.



WILD RADISH

BLADDERPOD

DEERWEED

NIGHTSHADE

BLADDERPOD Mustard Family
Isomeris arborea

HABITAT: Bladderpod is a common shrub in the desert as well as on the coast. In both places it grows in slightly salty areas.

APPEARANCE: A bad smelling shrub that is usually 3-4 feet tall with 3 leaflets, like a clover. The flowers can be the size of a quarter and are yellow and very showy with 4 petals. The fruit is a swollen, hanging pod. The pods start developing long before the petals wither.

REPRODUCTION: Bumblebees and other insects visit flowers. Reproduces by seeds.

ECOLOGICAL RELATIONSHIPS: Harlequin bugs live on the Bladderpod. These red, black, and orange "stink bugs" concentrate a toxic chemical from the plant in their bodies. They are not bothered by the chemical but predators avoid them.

WILD RADISH Mustard Family
Raphanus sativa

HABITAT: Common plant growing in disturbed soil and fields throughout much of California. It can not grow in sea water.

APPEARANCE: It has a 4-petaled flower from pale white to pink or lavender. All colors can be found in the same area. To be sure of your identification, look for the cylindrical fruits which are constricted between each seed.

REPRODUCTION: Pollinated by insects and spreads by seed.

ECOLOGICAL RELATIONSHIPS: It is a **native of Europe** and the supermarket radish is a cultivated form. The root is edible.

NIGHTSHADE Nightshade Family
Solanum spp.

HABITAT: Nightshades seek the high, dry ground. They are not tolerant of salt marsh conditions.

APPEARANCE: The showy flowers have five continuous petals which make a colorful plate under the pillar-like, yellow stamens. Often there are green nectar glands surrounding the stamens. Or common species has deep purple flowers; the fruits are small, dark berries.

REPRODUCTION: The flowers are insect pollinated, and plants reproduce from seeds.

ECOLOGICAL RELATIONSHIPS: This is one of the early spring flowers which provides nectar and pollen for numerous emerging insects. In order to protect developing fruits from predators, many members of this family produce a toxin which attacks the nervous system. NIGHTSHADE BERRIES ARE VERY TOXIC.

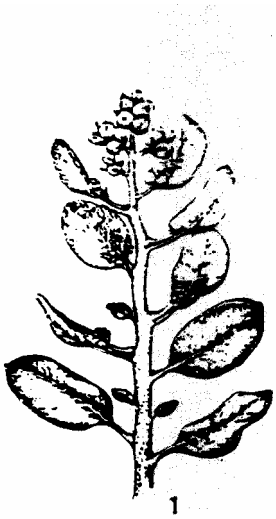
DEERWEED Pea Family
Lotus scoparius

HABITAT: This common shrub grows on dry disturbed habitat.

APPEARANCE: It is a low, bright green shrub with straight, spreading branches. It can look wild and disorganized. The flowers are yellow, fading to red after pollination. Since the red petals do not fall off, the plant has a two-tone look.

REPRODUCTION: This plant reproduces from seed only. The flowers are an important nectar source for bees.

ECOLOGICAL RELATIONSHIPS: Deerweed is frequently found growing on disturbed land. Disturbances can mean a trail, road's edge, vacant lot, or burned area. It is one of the first important plants to follow a fire. Bacteria living on the roots are able to change nitrogen from the air into a form which plants can use.



LEMONADE BERRY

LAUREL SUMAC

SALTBUSH

CALIFORNIA SAGEBRUSH

FLAT-TOP BUCKWHEAT

SALTBUSH Amaranth Family
3 kinds, 1 example
Quail Bush Atriplex lentiformis

HABITAT: Grows on brackish, fine, poorly drained soil.

APPEARANCE: Glands on the surface of the leaves give saltbush a pearly-grey luster. Break a small piece off the leaf and you will see the bright green of chlorophyll within.

REPRODUCTION: Like other members of this family, the flowers are different sexes, small and greenish. The developed fruits form flattened discs. The plants are pollinated by the wind.

ADAPTATION TO SALT: Saltbush does not grow in the lower areas of the salt marsh, but it is tolerant of salt because of special glands on the surface of the leaf. Under a powerful microscope, these glands look like tiny balloons. When a gland is full of the salt which are excreted from the leaf, it falls off and another takes its place.

ECOLOGICAL RELATIONSHIPS: Saltbush seeds contain lots of protein and oil. They are a favorite food for birds. People can eat them as emergency food.

LEMONADE BERRY [1] Sumac Family
Rhus integrifolia
LAUREL SUMAC [2]
Malosma laurina

HABITAT: Both are common chaparral shrubs found on dry uplands. They are not tolerant of salt marsh conditions.

APPEARANCE:
Look for thick, green leathery leaves. Lemonade Berry has smaller leaves than Laurel Sumac with teeth along the edge. The numerous small flowers are rose colored. The red fruits are covered with a sour sticky substance.
The large leaves of Laurel Sumac are smooth-edged and folded up along the midrib. Masses of small white flowers are at the tip of the branches.

REPRODUCTION: Both of these shrubs are insect pollinated and reproduce from seed.

ECOLOGICAL RELATIONSHIPS: As is true of most chaparral shrubs, these plants are hard to kill and sprout from the crown of the root following a fire.

FLAT-TOP BUCKWHEAT Buckwheat Family
Eriogonum fasciculatum

HABITAT: Common on the dry uplands. Grows on the edge of the salt marsh but the land is elevated beyond the reach of the tides.

APPEARANCE: A low shrub with many leafy branches. The edges of the leaves turn under; green above and grey wooly underneath. The flower heads look like white or pink balls on the end of a stick. The flowers turn brick red after pollination and stay on the plant.

REPRODUCTION: Buckwheat reproduces only by seeds.

ECOLOGICAL RELATIONSHIPS: The nectar and pollen are used by insects, especially the blue butterflies. Birds eat the seeds. It is an important ground cover.

CALIFORNIA SAGEBRUSH Sunflower Family
Artemisia californica

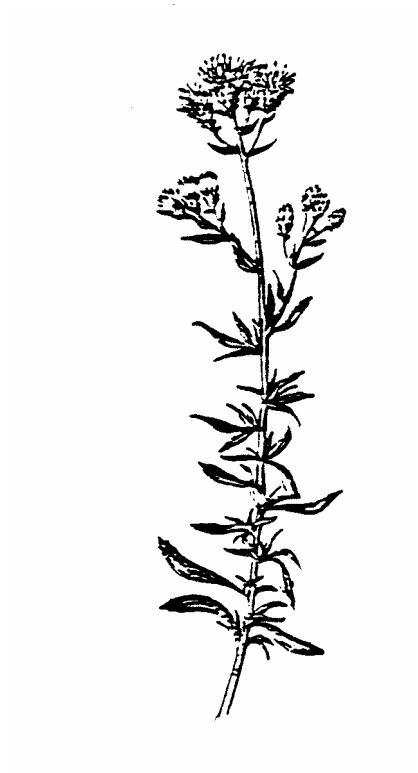
HABITAT: Sagebrush is common on upland slopes and does not tolerate salty soils well.

APPEARANCE: This shrub can be from two to five feet tall. It has gray-green leaves that are very fine and linear.

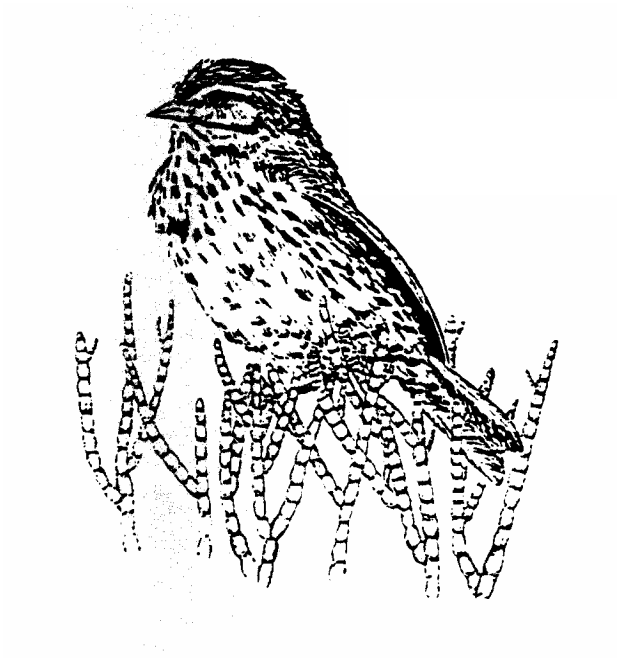
REPRODUCTION: Blooms from August to December. The tiny, hard-to-see flowers are pollinated by the wind. It grows from seed.

ECOLOGICAL RELATIONSHIPS: The best way to identify Sagebrush is to rub the leaves and smell them. It will remind you of the seasoning for your Thanksgiving turkey, and it can be used for just that purpose. When made into a tea it was an important herb to help Indian women during childbirth.

BUSH SUNFLOWER

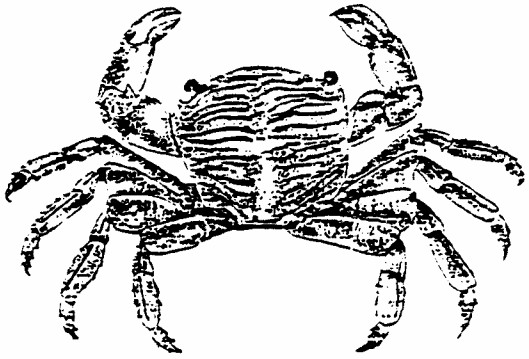


COASTAL GOLDENBUSH

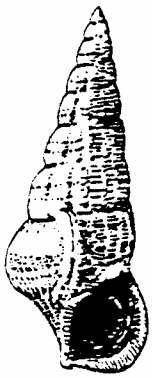


BELDING'S SAVANNAH SPARROW

STRIPPED SHORE CRAB



CALIFORNIA HORN SNAIL



COASTAL GOLDENBUSH Sunflower Family
Isocoma menziesii

HABITAT: Common on dry slopes and sandy areas.

APPEARANCE: A medium sized round shrub. The straw colored dried flowers stay on the plant for several months. Leaves may have small teeth along upper edge.

REPRODUCTION: Flowers are pollinated by insects.

ECOLOGICAL RELATIONSHIPS: This plant blooms until late fall and is frequently the last nectar source for insects, especially butterflies, before winter.

BUSH SUNFLOWER Sunflower Family
Encelia californica

HABITAT: Found on coastal bluffs and slopes.

APPEARANCE: A rounded shrub up to two feet high. The flowers have bright yellow rays with brown centers. The leaves are bright green.

REPRODUCTION: Insect pollinated.

ECOLOGICAL RELATIONSHIPS: This plant blooms from January through July and is an excellent nectar source for many insects.

STRIPED SHORE CRAB
Pachygrapsus crassipes

HABITAT: Most common intertidal crab in Southern California. Commonly seen on mud banks in salt marsh channels. Seen scuttling in and out of burrows excavated on channel edges.

APPEARANCE: Has a stripped back broader than long and can be either read or green.

ECOLOGICAL RELATIONSHIPS: Eats everything from algae to dead animals including live snails and insects. It is eaten by many animals from sea gulls to raccoons and even man.

CALIFORNIA HORN SNAIL
Cerithidea californica

HABITAT: Abundant on mudflats.

APPEARANCE: Spiral shell, looks somewhat like an ice cream cone, grey in color.

ECOLOGICAL RELATIONSHIP: Grazes on single celled algae and microorganisms on mud surface. Many parasites live in the snail.

BELDING'S SAVANNAH SPARROW
Passerculus sandwichensis beldingii

HABITAT: Nests in upper marsh in glasswort. Feeds throughout the marsh and the surrounding uplands and dunes.

APPEARANCE: A brown sparrow that has a streaked breast. Can have a yellow spot above the eyes. Frequently seen in flocks.

REPRODUCTION: Flowers are pollinated by insects.

ECOLOGICAL RELATIONSHIPS: These birds live only on the coast and require glasswort for nesting. They feed on insects. Unlike other sparrows they drink only salt water.