Suisun Marsh Vegetation Guidebook

A Field Identification Guide

Introduction

The Suisun Marsh is largest contiguous estuarine marsh in the lower forty-eight United States. It consists of 52,000 acres of diked managed wetland, 6,300 acres of unmanaged tidal marshes, and 27,700 acres of upland grassland. It also encompasses an additional 30,000 acres of sloughs and bays. This rich environment supports a wealth of plant and animal life. This guide is intended to help identify some of the more commonly encountered plants of the Suisun Marsh.

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Suisun
Resource Conservation District

Watergrass or Japanese Millet
(Echinochloa crusgalli)

GRASS FAMILY: Poaceae

Watergrass or Japanese Millet *(Echinochloa crusgalli)* - Non Native

DESCRIPTION: Watergrass is an annual grass with stems that can be either erect or reclining on the ground with ascending tips. It stands from 2 to 6 feet tall. The flower cluster can be either erect or nodding and has either one or two seed heads. The flower clusters are about 6 inches long, are green to purple in color, and can be either loose or dense. Commonly found in moist or wet soils throughout California below 5000 feet.

GROWTH REQUIREMENTS: Watergrass typically occurs in areas with the ability to flood and drain quickly with low salinity water. Seeds will germinate in brackish water, but if water or soil salinities are more than 7 mS/cm (5 ppt), the seedlings may not survive. If conditions in the pond are favorable, Watergrass will volunteer the following year from the previous years seed crop. Watergrass seed should be planted in the late spring or early summer. Mosquito problems may arise from the management of this plant, and care must be taken during the irrigation cycles. The ability to flood and drain within seven days is an important consideration, and water management must be well controlled and properly timed.

Notes and Observations:

Italian Rye Grass
(Lolium multiflorum)

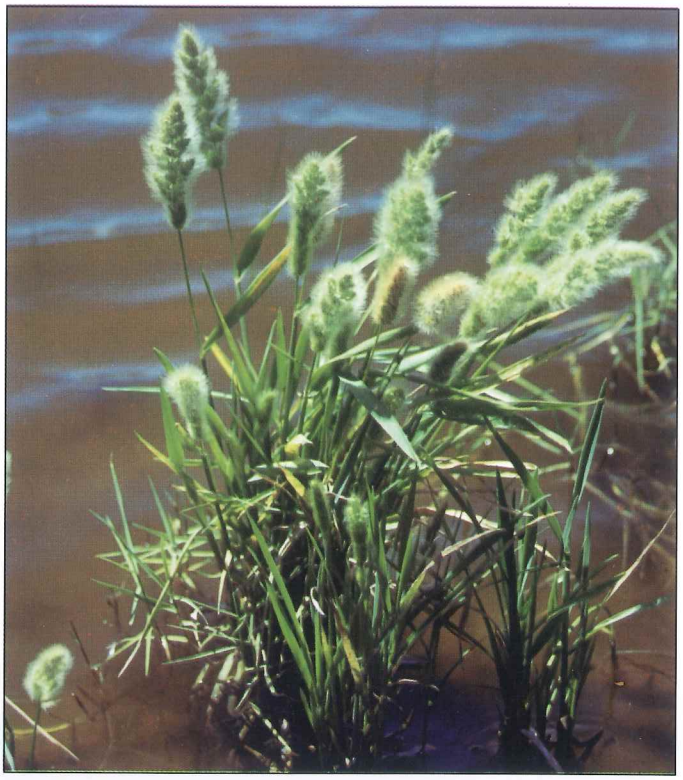
GRASS FAMILY: Poaceae

Italian Rye Grass *(Lolium multiflorum)* - Non Native

DESCRIPTION: Italian Rye Grass is an important nesting cover used by ground nesting birds species in the Suisun Marsh. Italian Rye Grass can be considered annual or biennial with flat leaf blades and simple erect stems, which stand 36 to 60 inches tall. It's leaves are 1 to 5 inches long and 0.125 to 0.25 wide.

GROWTH REQUIREMENTS: Italian Rye Grass requires little management once it has become established in a field. This plant is easily established on disturbed sites and abandoned fields. Occasional burning and mowing are the two most important treatments used on this upland species. Rye grasses are very common on disturbed sites and abandoned fields at elevations of less than 3200 feet.

Notes and Observations:



Rabbitsfoot Grass or Beard Grass
(Polypogon monspeliensis)

GRASS FAMILY: Poaceae

Rabbitsfoot Grass or Beard Grass *(Polypogon monspeliensis)* - Non Native

DESCRIPTION: This annual grass produces 8 to 40 inch tall stems that are either erect or reclining on the ground with ascending tips. The leaf blades of this plant are approximately 0.125 to 0.25 inches wide with a compound flower that is up to 6 inches long. The flower cluster is very dense and appears plume-like and tawny yellow when mature. The unique shape and look of this flower cluster gives rise to its name.

GROWTH REQUIREMENTS: This grass is one of the most common grasses found throughout California's wetlands. Rabbitsfoot Grass is indicative of seasonally or permanently saturated wetlands. This grass has the ability to withstand brackish and sometimes saline conditions in areas of severe disturbance.

Notes and Observations:

Swamp Timothy
(Crypsis schoenoides)

GRASS FAMILY: Poaceae

Swamp Timothy *(Crypsis schoenoides)* - Non Native

DESCRIPTION: Swamp Timothy is an annual plant that can be prostrate, ascending, or erect. The leaf blades are short and narrowly lance-shaped. Swamp Timothy is easily distinguished by its pink or purple stems and it's mat-like habit. It is commonly found in wet places at elevations lower than 1800 feet.

GROWTH REQUIREMENTS: Swamp Timothy is an uncommon plant in the Suisun Marsh and can only be grown in very freshest water years. It usually grows in pond bottom areas where water was removed late in the spring. It is an excellent waterfowl food plant, especially for Northern Pintail.

Notes and Observations:

Tall Wheatgrass
(Elytrigia spp.)

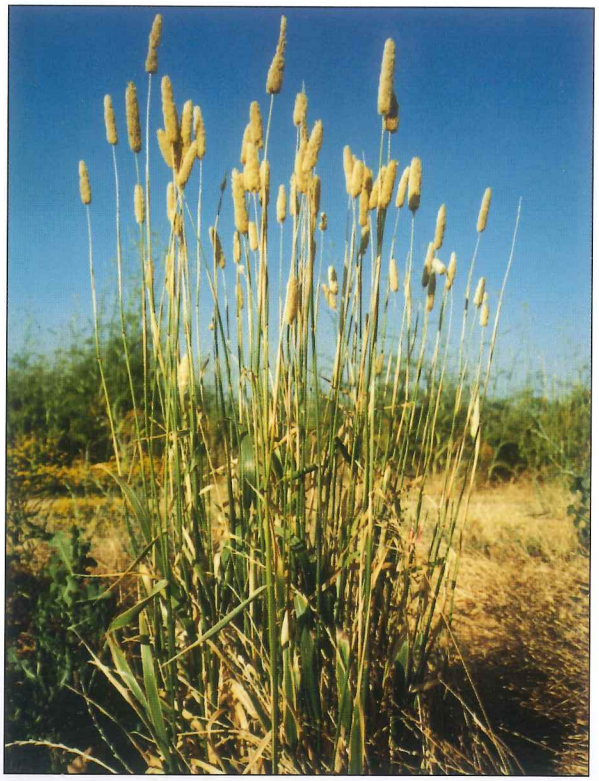
GRASS FAMILY: Poaceae

Tall Wheatgrass *(Elytrigia spp.)* - Non Native

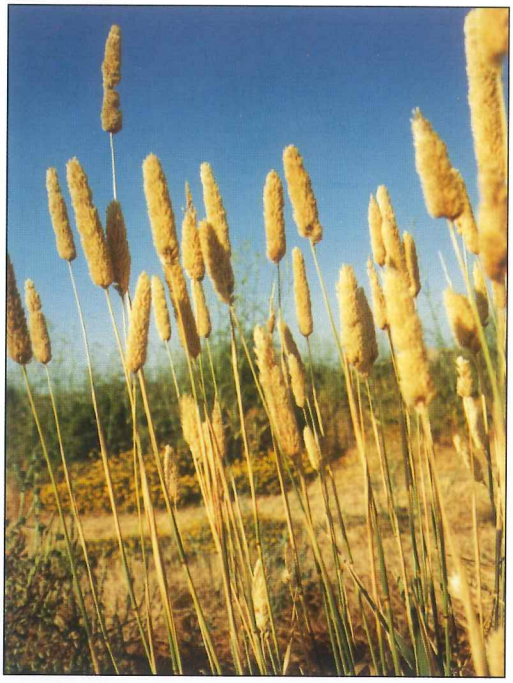
DESCRIPTION: Tall Wheatgrass is an important upland plant species that is used for food and nesting cover. This plant species generally arises from horizontal underground stems. The leaf blade is hairless and typically 0.75 to 2 inches wide. It is commonly found on disturbed sites. The stems of this species are erect and stand anywhere from 14 to 52 inches tall.

GROWTH REQUIREMENTS: Like most grasses, Tall Wheatgrass needs little management once it becomes established. Occasional mowing, burning, or discing may be required to maintain the field in an early stage of succession. This plant is most common on disturbed fields, at elevations of less than 5000 feet.

Notes and Observations:



Harding Grass
(Phalaris spp.)



GRASS FAMILY: Poaceae

Harding Grass *(Phalaris spp.)* - Non Native

DESCRIPTION: Harding Grass is a species of perennial grass with a base of branching, horizontal, underground stems which generally grows from June through September. This grass will grow in either clumps or from horizontal, underground stems with the aerial stems ranging from 24 to 60 inches tall. This grass is used for ground nesting and escape cover by waterfowl and other species of wildlife.

GROWTH REQUIREMENTS: Like most grasses, Harding Grass will need little management once it has become established. Occasional mowing, burning, or discing may be required to maintain the field in an early stage of succession where this plant will thrive. This plant is most common on disturbed fields, at elevation of less than 5000 feet.

Notes and Observations:

Barley
(Hordeum spp.)

GRASS FAMILY: Poaceae

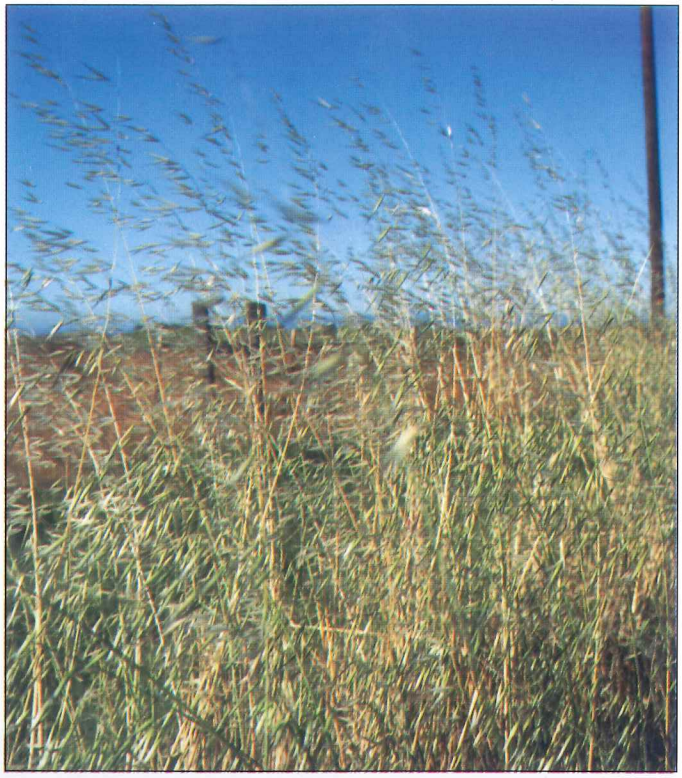
Barley *(Hordeum spp.)* - Native/Non Native

DESCRIPTION: This is an annual grass that stands 4 to 15 inches tall with a spike flower cluster that ranges from 1 to 4 inches long. At maturity, the seeds may cause injury to animals due to their sharply pointed joints. The flower cluster can be either whitish-green or purple.

GROWTH REQUIREMENTS: Like most grasses, Barley needs little management once it becomes established in a field. Many species of Barley are aggressive weeds and can quickly dominate certain sites. Occasional mowing, burning, or discing may be required to maintain the field in an early stage of succession where this plant will thrive. This plant is found most often on disturbed fields at less than 6500 feet in elevation.

Notes and Observations:

Wild Oat
(Avena fatua)



GRASS FAMILY: Poaceae

Wild Oat ***(Avena fatua)*** - Non Native

DESCRIPTION: Wild Oats are found on both cultivated soils and open fields. This species of grass can be anywhere from 8 to 19 inches tall with a stout erect stem and numerous flat leaf blades. This grass generally has many slender horizontal branches supporting numerous flower clusters.

GROWTH REQUIREMENTS: Like most grasses, Wild Oat needs little management once it becomes established. Occasional mowing, burning, or discing may be required to maintain the field in an early stage of succession where this plant will thrive. This grass is commonly found on disturbed sites at elevations less than 3600 feet.

Notes and Observations:

Brome
(Bromus spp.)

GRASS FAMILY: Poaceae

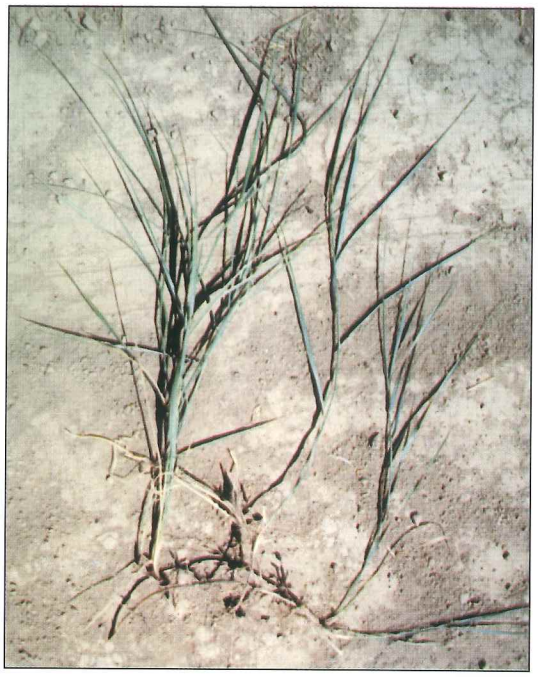
Brome *(Bromus spp.)* - Native/Non Native

DESCRIPTION: Brome grasses are native annual grasses commonly found in open spaces and waste areas that form dense stands across lowlands. This grass is generally a low-lying annual with rather flat leaf blades from 4 to 15 inches tall.

GROWTH REQUIREMENTS: Like most grasses, Brome grasses need little management once established in a field. Occasional mowing, burning, or discing may be required to maintain the field in an early stage of succession where this plant will thrive. This plant is most common on disturbed fields at elevations of less than 6500 feet.

Notes and Observations:

Creeping Wild Rye
(Leymus triticoides)



GRASS FAMILY: Poaceae

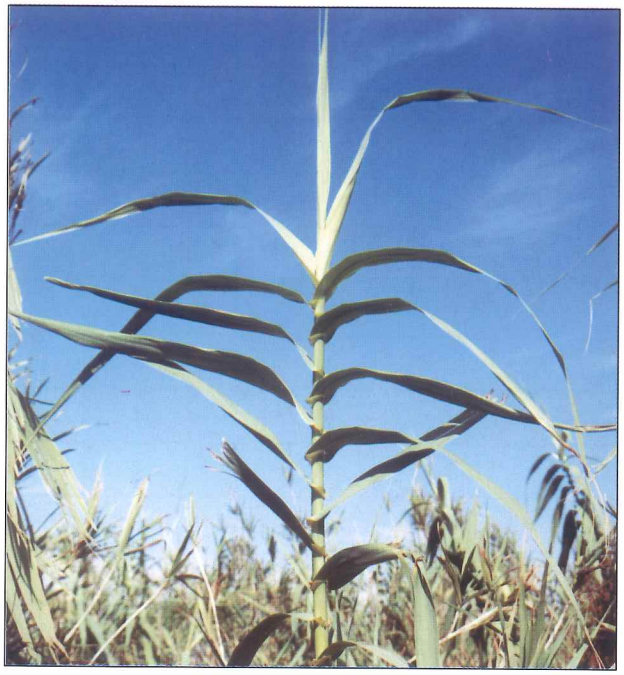
Creeping Wild Rye *(Leymus triticoides)* - Native

DESCRIPTION: Creeping Wild Rye is a perennial, usually with extensive creeping, horizontal, underground stems. Aerial stems single or in small clusters, about 0.375 of an inch in diameter, leaf blades are flat, 0.125 to 0.25 inches wide, and are rarely hairy. The flower cluster is a spike, 3 to 8 inches long, with 1 to 3 spikelets at each joint. The chaffy part of the flower is 2.5 to 4 inches long.

GROWTH REQUIREMENTS: Widely distributed throughout California, except in the deserts, and found in the mountains to an elevation of about 7500 feet, frequent on the dried or moist edges of meadows and flats; usually in heavy, often alkaline soil; also flourishing as a weed in waste places; western states.

Notes and Observations:

Giant Reed or Cane
(Arundo donax)



GRASS FAMILY: Poaceae

Giant Reed or Cane *(Arundo donax)* - Non Native

DESCRIPTION: Giant Reed is a tall, erect perennial cane or reed-like grass, which stands 4 to 16 feet tall. The leaves are two-ranked, 2 to 2.125 inches wide at the base and taper to a point. The flowers are large plume-like terminal compound flower clusters that appear between March and September. Plants will grow best in well-drained soils where abundant moisture is readily available.

GROWTH REQUIREMENTS: This plant does not produce a very viable seed, and in most of the areas it is established, it is due to transplanting by people. This plant can rapidly invade stream banks and roadsides through underground stems from a few planted individuals when the conditions are right. Individual plants can tolerate high levels of salinity.

Notes and Observations:

Pampas Grass
(Cortaderia selloana)

GRASS FAMILY: Poaceae

Pampas Grass *(Cortaderia selloana)* - Non Native

DESCRIPTION: Pampas Grass is a large perennial tussock-forming grass with abrasive leaf blades that grows in large, impenetrable clumps. The height of the tussock can reach up to 8 feet and the height of the flower head can reach up to 12 feet. The flower heads are large and silky, and range from white to pink. These plants usually begin to flower in their second year of growth, and use wind dispersion for invading new areas. When carried on a strong wind the seeds have been known to travel up to 15.5 miles from the mother plant.

GROWTH REQUIREMENTS: This plant is able to rapidly colonize an area and is invasive in drains, firebreaks, and logged and burned sites. Once established, Pampas Grass will to out-compete and smother native plants.

Notes and Observations:

Phragmites or Common Reed
(Phragmites australis)

GRASS FAMILY: Poaceae

Phragmites or Common Reed *(Phragmites australis)* - Native

DESCRIPTION: Phragmites is a perennial grass with a thick, creeping, horizontal, underground stem that can form dense stands. Phragmites has a thick stalk that can reach up to 13 feet tall in some extremely mature stands. The leaves are long, flat, and taper down towards the tip. These plants have a terminal flower tuft consisting of purplish flowers early in the growing season that turn into long, silky hairs at maturity. These plume-like flower clusters will persist throughout the winter.

GROWTH REQUIREMENTS: Large monotypic stands can be found in impoundments with stabilized water regimes. These areas have the ability to keep the soil moist for most of the year. Phragmites spread through vegetative reproduction by stout, creeping, horizontal, underground stems. A small piece of underground stem can form a new plant if it has as few as two or three joints and is approximately 8 inches long. Germination from seed does occur to a limited degree, but the most common method of reproduction is from vegetative means either through underground stems or from root masses breaking loose and floating to new sites. Seedling survival is low because the new site must remain moist, but not flooded.

CONTROL: Systemic herbicides are the most effective treatment for Phragmites. Roundup Pro® and Rodeo® applied by both aerial and hand applications have had the best results in controlling this problem plant.

Notes and Observations:

Saltgrass
(Distichlis spicata)

GRASS FAMILY: Poaceae

Saltgrass *(Distichlis spicata)* - Native

DESCRIPTION: Saltgrass is a low-growing perennial grass that forms from stout, yellowish, underground stems. The leaf blade is stiff and generally 0.75 to 4 inches long and 1-4 mm wide. Saltgrass is found in brackish and salt marshes lower than 3200 feet in elevation.

GROWTH REQUIREMENTS: Saltgrass will form dense, monotypic mats with a thick duff layer below. This species prefers relatively high ground, which is inundated for about 4 months per year. The dense mats this species forms will allow it to out-compete almost all other plant species.

Notes and Observations:

SUNFLOWER FAMILY: Asteraceae

Brass Buttons *(Cotula coronopifolia)* - Non Native

DESCRIPTION: Brass Buttons is an annual plant that derives its name from the bright yellow button-shaped flowers it produces. The stem is both low and erect or creeping along the ground in mats. There is also a variant of Brass Buttons with an aquatic life cycle. This type often forms dense floating mats in the pond. The stems are fleshy green, with roots that offshoot from the stem joints. The leaves are linear or oblong, and irregularly toothed or lobed. Brass Buttons are found in fresh and salt-water marshes, usually at elevations of less than 1000 feet.

GROWTH REQUIREMENTS: The plant will bloom year around if the soil remains moist. A summer pond bottom discing, which is followed by drawdown after the waterfowl season, will encourage the growth of this plant. Disturbed soils, especially along the pond edges will encourage the growth of Brass Buttons. If the water table drops to 6 inches below pond bottom the plant will become dormant and begin to turn brown. Brass Buttons will germinate soon after flood-up, and extend out from the roots 6 to 8 inches. After the pond is drained, the plants will develop normally. Brass Buttons are commonly found in moist soil habitats on both disturbed and undisturbed sites.

Notes and Observations:

Cocklebur
(Xanthuim strumarium)

SUNFLOWER FAMILY: Asteraceae

Cocklebur ***(Xanthuim strumarium)*** - Non Native

DESCRIPTION: Cockleburs are erect, annual herbs with a thick, fleshy stem that is less than 5 feet tall. The stem is often spotted with red or black, and the leaves are broad, triangular, and hairy. This plant will bloom from July through October. Cockleburs are easily recognizable due their large spiny fruits or burs. The burs are green to yellowish in color on younger plants, and turn brown at maturity. This plant is common in wetlands throughout California.

Notes and Observations:

SUNFLOWER FAMILY: Asteraceae

Coyote Brush *(Baccharis pilularis consanguinea)* - Native

DESCRIPTION: Coyote Brush is a large, woody shrub that can grow up to 6 feet tall and 8 feet wide. The stems are prostrate to erect with the branches spreading from the center. Most stands of Coyote Brush will be formed by several plants intertwining their limbs and forming what appears to be one large bush. The flowers are in a leafy compound flower cluster with a bell-shaped group of united scale-like leaves. The seeds of this plant are spread through wind action. Each seed is attached to filamentous chaff that will catch the wind and carry them to different locations.

GROWTH REQUIREMENTS: Coyote Brush is commonly found on the upland fields and levee tops throughout the marsh.

Notes and Observations:

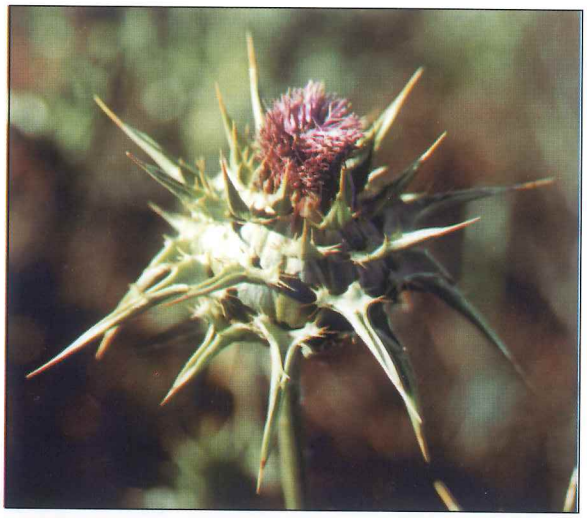
SUNFLOWER FAMILY: Asteraceae

Yellow Starthistle and Purple Starthistle ***(Centaurea solstitialis and Centaurea calcitrapa)*** - Non Native

DESCRIPTION: Yellow Starthistle is an annual plant with rough, bristly, lobed leaves. Its composite flowers are heads made up of many yellow flowers with spiny scale-like leaves. Purple Starthistle is an annual or perennial plant with deeply lobed, resin-dotted leaves. It has purple composite flower heads with spiny scale-like leaves. Both species range from 4 to 36 inches tall.

Notes and Observations:

Bull Thistle and Milk Thistle
(Cirsium vulgare and Silybum marianum)



SUNFLOWER FAMILY: Asteraceae

Bull Thistle and Milk Thistle ***(Cirsium vulgare and Silybum marianum)*** - Non Native

DESCRIPTION: Bull Thistle and Milk Thistle are perennials that are sometimes short lived, often dying after flowering only once. Thistles have erect stems and leaves that are tapered, often with wavy or lobed margins. Thistles are known for the spines on their leaves and floral heads. Thistles have floral heads that range in color from pink to purple.
Closely resembles Suisun Thistle.

Notes and Observations:

Bristly Ox-Tongue
(Picris echoides)

SUNFLOWER FAMILY: Asteraceae

Bristly Ox-Tongue *(Picris echoides)* - Non Native

DESCRIPTION: Bristly Ox-Tongue is an annual plant that stands 12 to 36 inches tall and has milky sap. The entire plant bears rigid hairs and scattered prickles. The leaves are 2 to 8 inches long, oblong, and have coarsely toothed or shallowly lobed margins. The flowering heads are yellow and measure 0.75 to 1.5 inches in diameter. The seeds are oblong, about 2 mm long and bear a white, cottony plume to aid in wind dispersal.

GROWTH REQUIREMENTS: A common weed of waste places at elevations under 450 feet. Usually found in disturbed areas, especially roadsides.

Notes and Observations:

Marsh Gumplant
(Grindelia stricta)

SUNFLOWER FAMILY: Asteraceae

Marsh Gumplant *(Grindelia stricta)* - Native

DESCRIPTION: Marsh Gumplant is a shrubby perennial, 0.7 to 5 feet high; with stems both reclining and erect. Basal leaves are tapered and larger than stem leaves. Flower clusters are generally gummy-sticky; heads 1 to many, somewhat hemispheric in shape. Ray flowers 30 to 60, yellow; disk flowers many, yellow, blooming May through September.

GROWTH REQUIREMENTS: Marsh Gumplant is found in shallow saltwater and brackish marshes within the peripheral halophyte zone, below 1700 feet. It occurs in these wetlands throughout the North Coast Ranges, extending to Alaska.

Notes and Observations:

Pickleweed
(Salicornia virginica)

GOOSEFOOT FAMILY: Chenopodiaceae

Pickleweed ***(Salicornia virginica)*** - Native

DESCRIPTION: Pickleweed is a perennial or sub-shrub that is 5 to 17 inches tall. This plant spreads from rooting, horizontal, underground stems. It is commonly found in salt marshes and alkali flats. Pickleweed plants have many branching and jointed stems with fleshy green sections between the joints. Pickleweed is a purple to dark green, low-growing succulent that is extremely salt tolerant. The plant flourishes in both diked managed wetlands and upper tidal areas.

GROWTH REQUIREMENTS: This plant usually is found growing in poorly drained and high saline pond bottoms and uplands that have been flooded for 6 months or less. Pickleweed is usually one of the first pioneers to re-inhabit a high saline pond bottom after soil salts are leached out enough to support plant life. This plant provides very good invertebrate structure and can support many species of wildlife, especially the omnivorous waterfowl species such as widgeon, gadwall, and shovelers. Pickleweed is also a major component in the recovery of the Salt Marsh Harvest Mouse and is critical to its survival.

Notes and Observations:

GOOSEFOOT FAMILY: Chenopodiaceae

Lamb's Quarters *(Chenopodium album)* - Non Native

DESCRIPTION: Lamb's Quarters is an annual plant that is 1 to 3 feet tall and heavily branched. The plants color is light green to dark green, and is found most often in farm lands and waste areas near marshes. The leaf shape closely resembles that of Fat Hen, and it will inhabit many of the same locations. Lamb's Quarters has a heavier stalk with thicker, more leathery leaves than Fat Hen.

GROWTH REQUIREMENTS: (See Fat Hen) Lamb's Quarters will typically grow on pond bottoms and will germinate later in the year than Fat Hen.

Notes and Observations:

Fat Hen
(Atriplex triangularis)

GOOSEFOOT FAMILY: Chenopodiaceae

Fat Hen *(Atriplex triangularis)* - Native

DESCRIPTION: Fat Hen is an annual plant 10 to 38 inches tall and with more than one stem arising from the base. The leaf blade is 0.5 to 2.75 inches wide and roughly shaped like an arrowhead. Fat Hen is common in salt and brackish marshes along the coast, and typically occupies the mid-elevation areas of the marsh in moist soil conditions.

GROWTH REQUIREMENTS: Fat Hen cannot survive when its roots are completely submerged for long periods. Stands typically occur in areas where the hydroperiod lasts from 3 to 5 months with the optimum time being 3 months. To encourage Fat Hen, draw down should begin in late January or February. The plant is subdominant on sites flooded for longer than five months. Specific conductivity ranging between 30 mS/cm (20 ppt) and 45 mS/cm (30 ppt) appears to give Fat Hen a competitive advantage over Baltic Rush *(Juncus balticus)* and Saltgrass *(Distichlis spicata)*.

Notes and Observations:

GOOSEFOOT FAMILY: Chenopodiaceae

Quail Brush or Big Saltbrush *(Atriplex lentiformis)* - Native

DESCRIPTION: Quail Brush is a large plant that will grow between 2 to 6 feet tall and will be generally wider than it is tall. The leaves are oblong to oval, about 0.5 to 1.5 inches long, and are a light gray in color. The flower axis is branched one or more times forming terminal clusters that have fruiting scale-like leaves that are united about the middle of the branch. This plant forms a small brown seed that is approximately 1.4 mm long. During the winter months some individuals of this species may become dormant appearing to have died.

GROWTH REQUIREMENTS: Quail Brush is commonly found on the upland fields and levee tops through out the marsh.

Notes and Observations:

MUSTARD FAMILY: Brassicaceae

Wild Radish *(Raphanus savitus)* - Non Native

DESCRIPTION: Wild Radish is an annual plant with a stem that is rough to the touch. The stems stand from 16 to 48 inches tall with many branches. The leaves are 4 to 8 inches long with a rounded apex. The flowers are purple at the top of the petals and fade to white towards the base, and are 0.25 to 1 inch long.

GROWTH REQUIREMENTS: This plant is commonly found in disturbed areas in uplands, along roadsides, and on the tops of levees. This is an important plant to breeding waterfowl and other species of ground nesting wildlife as cover.

Notes and Observations:

MUSTARD FAMILY: Brassicaceae

Wild Mustard *(Brassica spp.)* - Non Native

DESCRIPTION: Wild mustard is an annual non-woody plant that is 8 to 40 inches tall with sparse hairs on the stem. The lower leaves are lobed and can be found either at the base or along the stem. The flower clusters are generally found on the tip of the stem with yellow flowers. The fruit matures in a pod that can be either long and narrow, or short and relatively broad. This seed pod is divided into two chambers by a parchment like partition.

GROWTH REQUIREMENTS: The plant is commonly found in disturbed areas of high ground such as levee tops and along roadsides. This genus of plant is important to breeding waterfowl and other species of ground nesting wildlife as cover.

Notes and Observations:

MUSTARD FAMILY: Brassicaceae

White-top *(Cardaria spp.)* - Non Native

DESCRIPTION: The stem of White-top will range between 4 and 10 inches tall, and is covered in fine hairs. These plants have leafy stems that are branched near the top and bearing numerous tiny white flowers. The leaves are 1.5 to 4 inches long and lance-shaped with a lobed base that clasps the stem. The leaves and stems are grayish with dense white hairs. The flowers are white with hairy sepals and petals that are 0.125 inches long.

GROWTH REQUIREMENTS: This plant is commonly found on saline soils in fields and along ditch banks at elevations of less than 2000 feet. White-top is a noxious weed that should be controlled in the same fashion as Lepedium.

Notes and Observations:

Perennial Peppergrass
(Lepidium latifolium)

MUSTARD FAMILY: Brassicaceae

Perennial Peppergrass *(Lepidium latifolium)* - Non Native

DESCRIPTION: Perennial Peppergrass is an annual shrub that stands 10 to 25 inches tall with white petals on its flowers. The leaves arise from the base and are 2.25 to 3 inches wide with a toothed margin. This plant regenerates primarily from horizontal, underground stems and can quickly take over a disturbed area. It will also spread through clippings, so mowing stands of Perennial Peppergrass is not recommended. Perennial Peppergrass is commonly found in saline soils and a disturbed site such as roadsides and fire breaks.

CONTROL: The most effective treatment for Perennial Peppergrass is the application of Telar®or Round-up Pro®.

Notes and Observations:

Alkali Bulrush or Nutgrass
(Scirpus maritimus)

SEDGE FAMILY: Cyperaceae

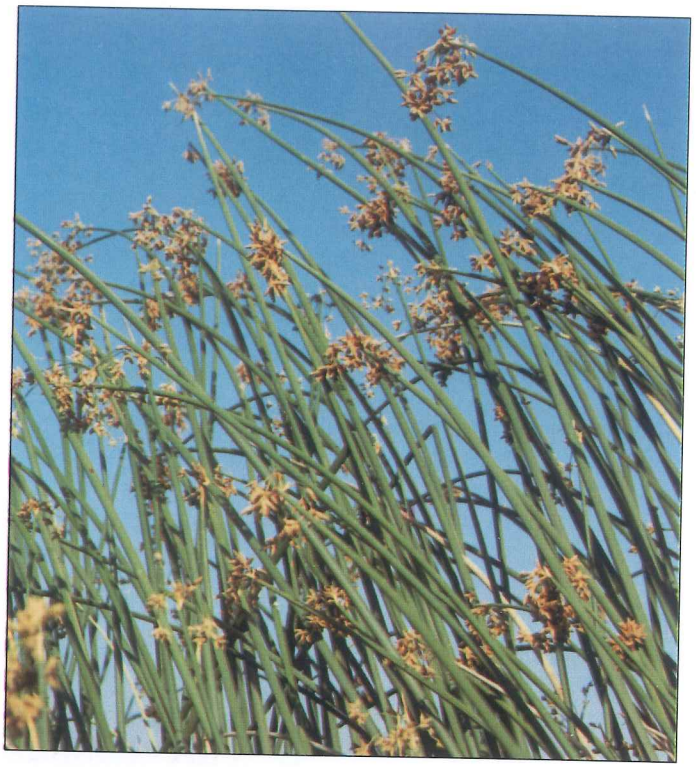
Alkali Bulrush or Nutgrass *(Scirpus maritimus)* - Native

DESCRIPTION: Alkali Bulrush is a stout, perennial herb that grows from long horizontal, underground stems. It generally has enlarged, fleshy, underground stems that are less than 0.75 of an inch wide. The aerial stems are upright and triangular with sharp angles and smooth sides, and are approximately 0.25 of an inch wide and 2 to 36 inches tall. The leaves are evenly distributed along the stem and approximately 0.25 of an inch wide. The seed head usually has 4 to many spikelets, which are 0.5 to 1 inch long and 0.25 of an inch wide usually found in one dense cluster at the top of the stem. The fruit is a smooth, shiny, dark brown nutlet that is more or less compressed, but is slightly convex in appearance. This plant is commonly found in marshes throughout California at elevations less than 8100 feet.

GROWTH REQUIREMENTS: Alkali Bulrush is a salt tolerant species and will survive in an environment with a specific conductivity up to a high of 42 mS/cm. Seven to eight months of submergence provide optimum growing conditions. Ponds where Alkali Bulrush is the target species should be drawn down to a mud flat in April or May. Leach cycles before this period are recommended. Low salt conditions are essential for growth during seed-head formation, normally from mid-April to mid-May.

Alkali Bulrush is able to tolerate large seasonal salinity changes, but recommended spring root zone salinities range from 11 to 22 mS/cm (7-14 ppt). Low spring salinities are most important for the successful germination of Alkali Bulrush.

Notes and Observations:



Tule
(Scirpus acutus)

SEDGE FAMILY: Cyperaceae

Tule *(Scirpus acutus)* - Native

DESCRIPTION: Tules are long, slender, rod-like perennial emergent plants that can reach a height of 7 to 8 feet, and can grow in water up to 4 feet deep. The leaves are basal sheaths that are approximately 3.125 inches in diameter which form large root balls. Tules are found in both salt and freshwater marshes below 8100 feet in elevation.

GROWTH REQUIREMENTS: Mature stands of Tule can form large, floating clumps, which become detached from the main rootstalk and drift away to become established in new areas. Tules are most often found in dense stands along the shorelines of sloughs, ditches, and permanent ponds. Tules require a hydroperiod of greater than 9 months in order to thrive.

Notes and Observations:

Three-Corner Bulrush
(Scirpus americanus)

SEDGE FAMILY: Cyperaceae

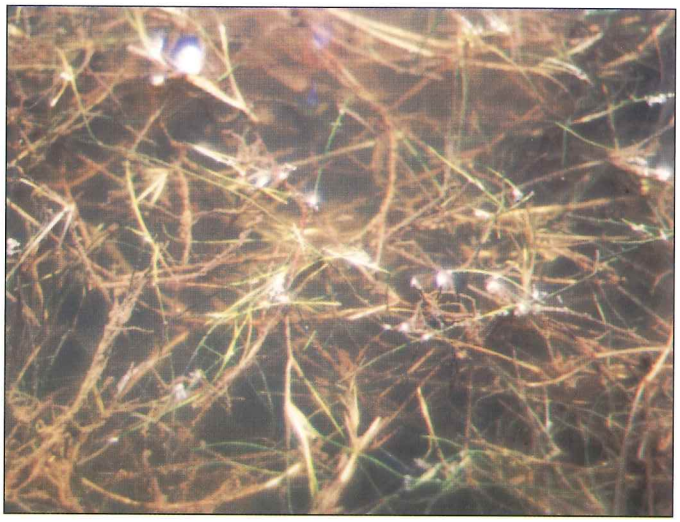
Three-Corner Bulrush *(Scirpus americanus)* - Native

DESCRIPTION: Three-Corner Bulrush is a perennial plant with long, horizontal, underground stems. Aerial stems sharply triangular, 12 to 43 inches tall. Basal leaves up to 7 inches long, keeled and about 0.125 inches wide. Single leaf arising from just below the flower cluster 1 to 4 inches long. Flower cluster consists of 1 to 7 spikelets, about 0.375 inches long, about 0.3 inch wide, often in one stalk-less cluster. Fruit is lens-shaped or triangular but weakly angled and about 0.375 inches long.

GROWTH REQUIREMENTS: Widely distributed in wet ground: along coast from Ventura County to Del Norte County, occasional in San Bernardino County and Imperial County; Inyo, Mono, Lassen, and Modoc Counties. Sacramento and San Joaquin Valleys.

Notes and Observations:

Wigeongrass
(Ruppia martima)



PONDWEED FAMILY: Potamogetonaceae

Wigeongrass *(Ruppia martima)* - Native

DESCRIPTION: Wigeongrass sprouts from slender, horizontal, underground stems and the above-ground stem forms many thread-like branches. It has slender leaves less than 4 inches long and less than 1 mm wide. The leaves are more or less completely fused at the base forming a sheath around the stem. In shallow water areas, Wigeongrass often has a majority of its leaf mass just above the pond bottom. In deeper sites, the plants tend to have long stems with small mostly unbranched leaves. A single Wigeongrass plant can have as many as 2 to 15 stem joints rooting on a single horizontal, underground stem. This plant has a perennially submersed flower cluster. The seeds produced by Wigeongrass have the ability to withstand long periods of drought and excessively high water salinity.

GROWTH REQUIREMENTS: Wigeongrass is a species of submergent vegetation commonly found in seasonally and permanently flooded freshwater and marine wetlands, and is considered one of the most valuable food resources for migrating waterfowl. Wigeongrass is a very salt tolerant species and is able to recover after experiencing salinities of up to 44 mS/cm. It is most commonly found in brackish ponds, marshes, and sloughs with water depths of 2 to 4 feet, at elevations below 250 feet. Large stands of Wigeongrass can be wiped out by increased water turbidity, or by completely drying out a pond bottom. Wigeongrass grows best in calm, still waters and not in areas with excessive turbulence. They can however withstand moderate currents and at times form robust stands in these conditions.

Notes and Observations:

Sago Pondweed
(Potamogeton pectinatus)

PONDWEED FAMILY: Potamogetonaceae

Sago Pondweed *(Potamogeton pectinatus)* - Native

DESCRIPTION: Sago Pondweed produces enlarged, fleshy, underground stems that are rich in carbohydrates and an excellent food source for waterfowl. The dense mats these plants form also provide excellent habitat for invertebrates, which is a good source of food for nesting hens and young waterfowl. Wave action, whether from high winds or carp (Cyprinus carpio) swimming and foraging, can increase turbidity and can have a detrimental effect on the production of Sago Pondweed. The root system of Sago Pondweed, like most submergents, is very shallow. For greater stability, some of the lower branches often become rooted in the bottom sediments. The branches sprout from horizontal, underground stems that fan out across the pond bottom. The leaves may grow to a length of 9 inches long, 0.25 to 2.5 mm wide, and 0.2 to 1.0 mm thick. Flowering from this plant is thought to be light-initiated and the flowers are typically pink.

GROWTH REQUIREMENTS: Sago Pondweed is one of the most important food plants for migrating waterfowl and is commonly found in submerged plant communities of many permanent ponds throughout the Marsh or in ponds where water is absent for no more than 1 to 3 months. This plant can be considered a pioneer species, because it will re-establish newly flooded and disturbed sites. Sago Pondweed grows well in brackish water systems and will re-establish in sites that have been previously inundated by sea water. The optimum soil or water salinity range for Sago Pondweed is approximately 16 mS/cm. Due to the detrimental effect high turbidity has on stands this species grows best in the deeper portions of the permanently flooded wetlands.

Notes and Observations:

California Rose
(Rosa californica)

ROSE FAMILY: Rosaceae

California Rose *(Rosa californica)* - Native

DESCRIPTION: The stem of this shrub is gray-brown with prickles that are compressed from side to side and strongly curved. The California Rose stands 32 to 100 inches tall, often forming dense thickets. The leaf blade is blunt and the margin can be either single or double-toothed. The fruit is a bright red rose hip that is approximately 0.125 to 0.75 inches wide. This shrub produces a whitish pink flower.

GROWTH REQUIREMENTS: This rose generally forms dense thickets along levees and roadsides in moist areas. This species of plant is excellent for use as bank stabilizing vegetation.

Notes and Observations:

Blackberry
(Rubus discolor)

ROSE FAMILY: Rosaceae

Blackberry *(Rubus discolor)* - Non Native

DESCRIPTION: Blackberries are large woody plants that will form dense, almost impenetrable, brambles in disturbed areas of high ground. The stem is generally 0.25 to 0.625 inches in diameter with many prickles. The leaves are compound, widest at the middle and sharply toothed, with white on the underside. Blackberries will produce white to pinkish flowers and a dark reddish fruit.

GROWTH REQUIREMENTS: Blackberries are perennial shrubs that form dense thickets on moist areas such as levees, roadsides, and stream banks. This plant is excellent as bank stabilizing vegetation. This plant is most commonly found at elevations less than 5200 feet.

Notes and Observations:

Curly Dock
(Rumex crispus)

BUCKWHEAT FAMILY: Polygonaceae

Curly Dock *(Rumex crispus)* - Non Native

DESCRIPTION: Curly Dock is a stout, perennial herb generally less then 5 feet tall. The leaves are generally less than 12 inches long and lance-shaped with a margin that is strongly curled, especially near the base. The flower cluster is arrayed in an erect tuft containing a shiny brown nutlet. Curly Dock can be easily recognized by its reddish-brown color and curly leaves.

GROWTH REQUIREMENTS: Curly Dock is a very conspicuous exotic weed commonly found on disturbed sites throughout California's wetlands. It is common and widespread in wet or moist meadows, flats, and shallow marshes of fresh and brackish water. This plant is able to tolerate a wide range of flooding regimes and soil chemistries.

Notes and Observations:

Smartweed
(Polygonum spp.)

BUCKWHEAT FAMILY: Polygonaceae

Smartweed *(Polygonum spp.)* - Native/Non Native

DESCRIPTION: Smartweeds are annual or perennial shrubs and vines with stems that can be prostrate or erect. These plants can be aquatic, terrestrial, or amphibious, and are found with swollen joints along the stem. Most Smartweeds have upright, branched stems with lance-shaped leaves. The flowers are spikes at the end of the stems and can be pink, or white in color. Each flower will enclose a single brown or black seed.

GROWTH REQUIREMENTS: Smartweed is considered a valuable waterfowl food plant. Smartweed is subject to a type of fungus known as smut, which destroys the plant seeds. There is no known treatment for the smut fungus as it infects nearby plants through airborne spores. Smartweed requires moist soil management similar to watergrass.

Notes and Observations:

Fennel or Anise
(Foeniculum vulgare)

CARROT FAMILY: Apiaceae

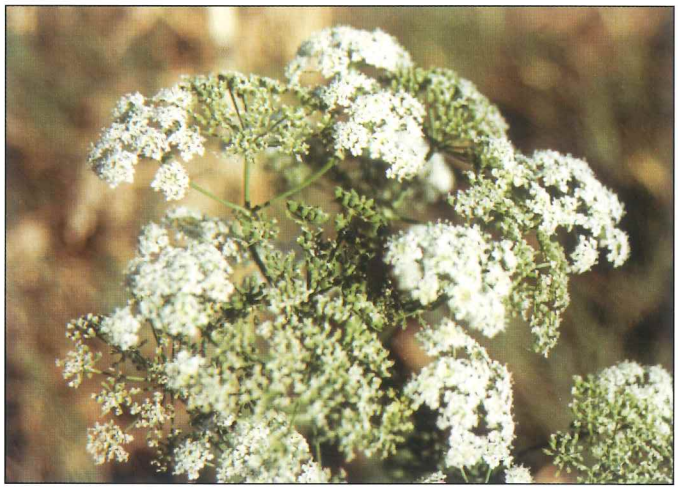
Fennel or Anise *(Foeniculum vulgare)* - Non Native

DESCRIPTION: Fennel is a perennial plant that is 36 to 50 inches tall with an erect and branching stem. This species of plant has a strong licorice scent and the seeds are often harvested as a spice. The leaves of this species are triangular, 8 to 10 inches wide and are finely dissected into thin thread-like blades. The flower cluster is composed of 15 to 40 stalks of approximately equal length, each topped by a smaller number of stalks containing flowers. The flower petals are yellow and taper towards the tip.

GROWTH REQUIREMENTS: This plant is very common on moist soils especially on disturbed sites near roadsides and levee tops. Fennel will thrive in areas of high disturbance.

Notes and Observations:

Poison Hemlock
(Conium maculatum)



CARROT FAMILY: Apiaceae

Poison Hemlock *(Conium maculatum)* - Non Native

DESCRIPTION: This species of biennial plant contains highly toxic alkaloids that will kill humans and animals if eaten. The stems are erect, stand from 2 to 4 feet tall, and are green with a purple spotting running the length. The leaf blade is triangular with serrated edges, can be from 6 to 12 inches wide and has a doubled arrangement of lateral segments along common axes. The flower cluster has many white flowers arranged on few to many stalks of approximately equal lengths. The seeds of this plant closely resemble those of Anise, are one-eighth inch long and are compressed side to side with ridges running along the length. The toxins can be found throughout the entire plant and it produces a strong mousy odor when bruised. The most distinguishing feature between Hemlock and Anise is the lack of purple spotting on the stems of Anise.

GROWTH REQUIREMENTS: This plant is very common on moist soils especially on disturbed sites near roadsides and levee tops. Poison Hemlock will thrive in areas of high disturbance.

Notes and Observations:

LEGUME FAMILY: Fabaceae

Bird's-Foot Trefoil *(Lotus corniculatus)* - Non Native

DESCRIPTION: Bird's-Foot Trefoil is an annual herb with stiff, straight, sharp, hairs that lay against the stem. The stem is either reclining on the ground or ascending. Compound leaves are composed of 5 leaflets, 0.2 to 0.8 inches long, and are linear or slightly larger above the middle in shape. Three leaflets are arranged palmately at the leaf axis tip; remaining two leaflets are arranged oppositely at the base of the axis. Flower cluster is composed of 3 to 8 bright yellow flowers with or without some red, 0.3 to 0.5 inches long, appearing June through September. Fruit is a capsule, 0.6 to 1 inch long, narrowly oblong, and opening at maturity.

GROWTH REQUIREMENTS: Bird's-Foot Trefoil is often found in open seasonally wet flats and depressions that dry out by mid-summer. It is characteristic of many disturbed habitats in the Central Valley and in California.

Notes and Observations:

Delta Tule Pea
(Lathyrus jepsonii)

LEGUME FAMILY: Fabaceae

Delta Tule Pea *(Lathyrus jepsonii)* - Native

DESCRIPTION: The Delta Tule Pea a federally listed species of special concern. Of the several sensitive plants found in the Suisun Marsh, Delta Tule Pea will be the most commonly found. Landowners will likely encounter it on the exterior levees and tidal berms. This plant grows in the middle and high marsh zones of the tidal sloughs, channels, and outboard sides of levees. This is a perennial plant with a stem that has no hair, and has wings on each side. The leaflets number 10 to 16 and arise on opposite sides of the leaf stalk. The leaflets are lance-shaped with tendrils at the apex. The flowers are pink to pink-purple. Delta Tule Pea is found at elevations of less than 75 feet.

Notes and Observations:

Vetch
(Vicia spp.)

LEGUME FAMILY: Fabaceae

Vetch *(Vicia spp.)* - Non Native

DESCRIPTION: Vetch is a vine-like non-woody member of the pea or bean family with leaves on its tendrils that will cling to other plants. The flowers can be purple, white, or yellow. The seed pod is laterally compressed with two compartments and both compartments contain many seeds (similar to a pea pod). The leaves have a common elongate axis with four to many leaflets arranged along either side.

GROWTH REQUIREMENTS: This plant is important to breeding waterfowl and other species of ground nesting wildlife as cover. When planting Lana Vetch the seedbed should first be prepared by discing. The seeds should then be mixed with a nitrogen fixer before being drilled into the ground at least 0.25 inch. Covering the seeds by drilling will improve the stand during the first few years of growth, and will yield better results than broadcasting alone. The seeds should be sown in September or October depending on the type of water year. In California, this plant will behave as a winter annual, germinating in the late fall. It will put on most of its growth in the early spring and mature in late May. Purple Vetch can be considered both an annual and a biennial, and is more of a succulent than Lana Vetch.

Notes and Observations:

Baltic Rush
(Juncus balticus)

RUSH FAMILY: Juncaceae

Baltic Rush *(Juncus balticus)* - Native

DESCRIPTION: Baltic Rush is an unbranched, slender perennial with stout, needle-like and dark green leaves. This plant is approximately 14 to 44 inches tall, and will invade new areas on creeping, underground, horizontal stems. The aerial stems can form small clusters or arise singly from a single creeping rootstock. All stems have bladeless, basal, leaf sheaths and are 0.04 to 0.2 inches wide. The flower cluster appears laterally on the stem near the apex with from 5 to 50 individual flowers.

GROWTH REQUIREMENTS: Baltic Rush grows in both upland and wetland habitats, and can be found in both permanently and seasonally saturated soils of wet meadows and managed wetlands at elevations of less than 6500 feet. Baltic Rush does not provide significant amounts of waterfowl and wildlife food, and will prevent the growth of preferred food plants.

Notes and Observations:

Cattail
(Typha spp.)

CATTAIL FAMILY: Typhaceae

Cattail *(Typha spp.)* - Native

DESCRIPTION: Cattails are perennial, emergent monocots which can grow from 4 to 6 feet tall. The stems are upright and smooth, with up to eight half-inch wide, elongate, and with smooth leaves wrapping around them. Each plant produces a 6 to 12 inch long cigar-shaped seed head that scatters downy airborne seeds in the fall. The seeds are elliptical, usually 1/20 of an inch long.

GROWTH REQUIREMENTS: The dense emergent stands they can form provide important sources of food and cover for wildlife. Individual plants will spread extensively from horizontal, underground stems, so that a large stand may consist of only one or two individual plants. One method of establishing new stands of Cattails in a pond is to dig up Cattail clumps from elsewhere and allow them to free float through the pond and settle in the pond margins. The underground stems will eventually fall out of these clumps and become established if water conditions are right. Planting bulbs in strategic areas of the pond can also be an effective method of introducing them into new areas. Cattails require a hydroperiod of greater than 9 months in order to thrive.

Notes and Observations:

Sea Purslane
(Sesuvium verrucosum)

FIG-MARIGOLD FAMILY: Aizoaceae

Sea Purslane *(Sesuvium verrucosum)* - Non Native

DESCRIPTION: Sea Purslane is a low lying annual shrub that can be either prostrate or erect and will commonly form low mats over 3 feet in diameter on the pond bottom. The seeds are smooth and shiny, typically brown to black in color. Flowers are small and typically rose pink to purplish. This plant is an excellent food plant for many different seed eating species of wildlife.

GROWTH REQUIREMENTS: Sea Purslane is extremely salt tolerant, and will survive in soils with specific conductivity of up to 100 mS/cm. They typically occupy pond bottoms that no other plants can occupy due to the high salinities. Upon first flood up, waterfowl have been seen feeding in areas with Sea Purslane, probably on the fleshy leaf material and small, smooth black seeds. The plant material decays at a very rapid rate and will disappear from the ponds in a matter of weeks after initial flood up.

Notes and Observations:

FRANKENIA FAMILY: Frankeniaceae

Alkali Heath *(Frankenia salina)* - Native

DESCRIPTION: Alkali Heath is a small subshrub that forms a dense mat, which is generally less than 6 feet in diameter. The flowers can be born singly or on a compound flower cluster on the uppermost stem/leaf angle. The stem is somewhat prostrate with twigs that can be with or without hairs. The flowers of Alkali Heath can be white, pinkish, or blue. The leaves of this plant are light green and covered by fine hairs. Alkali Heath is considered one of the plants associated with Salt Marsh Harvest Mouse habitat.

GROWTH REQUIREMENTS: Alkali Heath is commonly found on hypersaline salt marshes and alkaline flats throughout California at elevations of less than 2500 feet. Alkali Heath tends to be found along the pond margins in the drier sites at higher elevations.

Notes and Observations:

Dodder
(Cuscuta spp.)

DODDER FAMILY: Cuscutaceae

Dodder *(Cuscuta spp.)* - Native

DESCRIPTION: Dodder is a twining yellow or orange vine-like parasite of plants that is sometimes tinged with purple or red. The stem can be both thin and thread-like or very stout. Flowers are usually white.

GROWTH REQUIREMENTS: Dodder is a parasite of both wild and cultivated plants, and obtains its nutrients (water, minerals, and carbohydrates) through a modified root system that penetrates the host plant tissues. This plant produces seeds that drop to the ground and germinate in the next growing season if a suitable host is present nearby. If there is no host available then the seed can remain dormant for up to five years. If the seed does begin to germinate then the seedling must make contact with a host within a few days or it will die.

Notes and Observations: