






Suisun Marsh Vegetation Guidebook

A Field Identification Guide to
Selected Plants of Suisun Marsh



The Suisun Marsh is the largest contiguous brackish estuarine marsh in the continental United States. It consists of ~50,000 acres of diked seasonally managed wetlands, ~7,500 acres of unmanaged tidal marshes, and ~28,000 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 vegetation guidebook is intended to help identify some of the more commonly encountered or notable plants of Suisun Marsh. Other plants not found in this guidebook may be identified through plant identification keys, online resources, and recently developed applications for portable devices. Plants are grouped into four ecotones including aquatic, wetland, transitional, and upland listed by common name in the front Table of Contents. An Index in the back organizes plants by family. Nonnative and invasive plants are indicated as are good waterfowl food plants (, nesting cover plants (); rare species (, nonnative invasives (, and undesirable pests ().

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Alligator Weed

Alternanthera philoxeroides

Other names: pigweed, alligator grass



1 mm

 *nonnative, invasive*



0.3-3.3'



February-March



2.0-4.3" l, 0.4-0.8' w



Description

Alligator Weed is characterized by an opposite leaf pattern that sprouts from central nodes. Its hollow, horizontal stems can reach over 30 feet in length and easily float. Small, whitish, papery flowers can be found along its short stalks or stems. The root system of this species allows plants to hang free in water to absorb nutrients or penetrate in soils/sediments to pull nutrients from the ground. Alligator Weed can form dense mats in aquatic environments, which stem the flow of water and disrupt natural habitats. Other vegetation will struggle to compete with Alligator Weed, as these dense mats block sunlight from submerged vegetation. This in turn reduces food sources for wildlife, such as waterfowl.

Habitat

Native to South America, Alligator Weed is considered an invasive species in many wetlands in the United States. It can thrive in both dry and aquatic environments. In aquatic environments, Alligator Weed requires shallow water no deeper than 7 feet. There is currently no record of viable Alligator Weed seeds in its nonnative range – the species can therefore only reproduce in Suisun Marsh through fragmentation of existing plants.

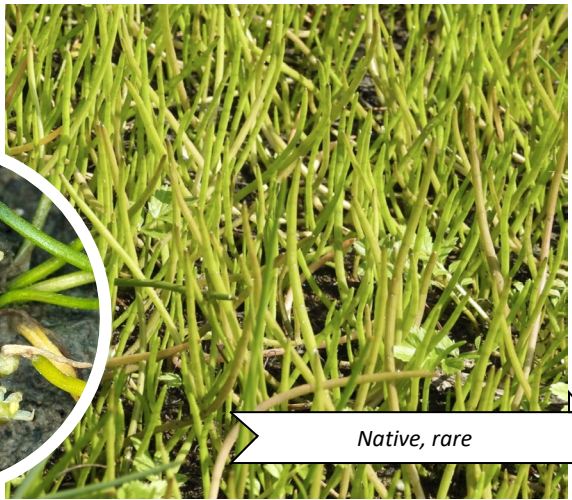
Management

Alligator Weed can regenerate from small portions of stems or leaf cuttings; therefore, inefficient removal of the species can result in ineffective control. Early detection is considered the best form of management: in terrestrial environments, ensuring disturbed areas are repopulated with native vegetation before alligator weed has established will make invasion difficult. A variety of herbicides, including glyphosate, have been shown to be effective in eradicating alligator weed. However, use of chemicals on aquatic invasives can at times be challenging in Suisun Marsh and requires special permitting.

Mason's Lilaeopsis

Lilaeopsis masonii

Other names: mudflat
quillplant



Native, rare



0.6-3.0"



April-November



0.6-3.0" w



Description

Mason's *lilaeopsis* is a grasslike perennial herb, growing in small continuous tufts that spread via rhizome clonal reproduction. Its hairlike or thready leaves are generally no more than several inches high and lime green in color. The inflorescence is a small, threadlike cluster of tiny green/white or maroon flowers that each yield a spherical fruit.

Habitat

Mason's *lilaeopsis* is native to California found only in the Sacramento-San Joaquin River Delta and the San Francisco Bay Estuary. Mason's *lilaeopsis* is found predominately in freshwater or brackish marshes. It occurs throughout Suisun Marsh along tidal slough edges. It is a colonizing species and is one of the first species to begin growing on newly deposited or exposed sediments.

Management

Mason's *lilaeopsis* was state-listed as "Rare" in November 1979. This species is considered to be seriously threatened in California. Disturbance, such as erosion, dredging, and agriculture can jeopardize populations of this species.



Parrot's Feather

Myriophyllum aquaticum

Other names: parrotfeather
Brazilian watermilfoil



! nonnative, invasive



1.0'



July-August



0.2-1.0" w, 1.0-2.8" l

Description

Parrot's Feather is a stout aquatic perennial plant that forms dense mats of intertwined brownish stems (rhizomes) in water. Stems are suspended in the water column or floating. Both stems and submerged leaves may be reddish tinted. Emergent leaves are whorled, stiff, and usually have 20 or more linear divisions (10 leaflet pairs) on each leaf. The leaves appear feather-like and grayish green and can extend to 12" above the water surface. Small, white flowers occur in the leaf axils on the emergent shoots.

Habitat

Native to the Amazon River basin in South America, Parrot's Feather was introduced to the United States in about 1890. Commonly sold for aquaria and aquatic gardens, it has escaped to become invasive in ponds and other calm water bodies throughout the region. It can be found in freshwater lakes, ponds, and canals with slow-moving waters in northern and central California.

Management

This invasive plant may compete with native aquatic plants, eliminating them or reducing their numbers in infested sites. It forms dense mats that can entirely cover the surface of the water in shallow ponds and other waterways. The species does not produce viable seed and its distribution is limited to vegetative dispersal mechanisms. Attempting to control by manual or mechanical means tends to spread the plants and should only be conducted in small, contained water bodies. Draining a pond in the summer achieved control in one instance, but draining may not achieve control in the winter.

Sago Pondweed

Stuckenia pectinata

Other names: ribbon weed,
fennel pondweed



2 mm



Up to 9.8'



May-July



0.8-4.5' l, 0.5' w



Description

Sago Pondweed is an underwater grass with bushy clusters of thread-like leaves that grow alternately along slender, branching stems. The root system of this species, like most submergent vegetation, 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 0.2 to 1 millimeter thick. The flowers are typically pink and are thought to be initiated by light.

Habitat

Sago Pondweed has a nearly global distribution and is native to most of Canada and the United States. It is commonly found submerged in permanent ponds throughout Suisun Marsh or in ponds where water is absent for no more than 1 to 3 months. Sago Pondweed grows well in brackish water systems and will reestablish in sites that have been previously inundated by sea water. This plant can be considered a pioneer species because it will reestablish newly flooded and disturbed sites.

Management

Sago Pondweed produces enlarged, fleshy, underground stems or corms that are rich in carbohydrates and an excellent food source for waterfowl including canvasbacks (*Aythya valisineria*). The dense mats these plants form also provide excellent habitat for invertebrates, which is a good source of food for nesting hens and juvenile waterfowl. The optimum soil or water salinity range for this species is approximately 16 mS/cm (14-19 mS/cm). Due to the detrimental effect high turbidity has on stands, Sago Pondweed grows best in the deeper portions of the permanently flooded wetlands. Wave action, whether from high winds or carp (*Cyprinus carpio*) movements, can increase turbidity and can have a detrimental effect on the production of this plant.



Water Hyacinth

Pontederia crassipes

Other names: hyacinth



1 mm



0.3-3.3'



June-November



5.9" w



Description

Water Hyacinth is a floating freshwater perennial that jams rivers and lakes with tons of floating plant matter. Floating mats of this plant can weigh up to 200 tons per acre. The leaves are oval to elliptical, thick, wide, and waxy with spongy petioles. Leaves curve inward at the edges. The very showy blue-purple flowers are born on upright spikes. Each flower has six petals with the uppermost having a yellow patch.

Habitat

Native to South America, Water Hyacinth has invaded aquatic areas throughout the eastern and southern portions of the United States. In California, it is typically found below 660 feet (200 m) elevation in the Central Valley, San Francisco Bay Area, and south coast. It is a major undesirable aquatic plant of the Delta of the San Francisco Estuary.

Management

Water Hyacinth invades lakes, ponds, rivers, marshes, and other types of wetland habitats. It can quickly form dense floating mats of vegetations (populations can double in size in two weeks!). These dense mats reduce the light availability for submersed plants and aquatic invertebrates and deplete oxygen levels. Water Hyacinth can be removed by raking or seining it from the pond's surface. Care must be taken to remove all plant material, including small fragments.

Water Primrose

Ludwigia peploides

Other names: marsh purslane,
floating primrose willow



6" – 10"



June-October



0.1-1.6" w, 0.4-3.9" l



Description

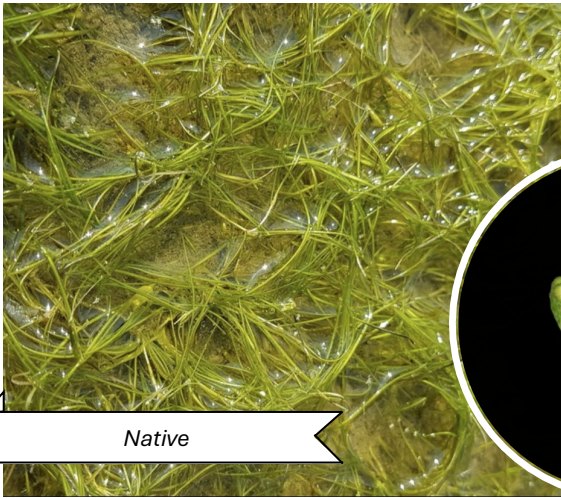
Water Primrose is an herbaceous, perennial plant who sprawling stems usually grow flat along mud or a water surface. Leaves are green in color and can be lance-shaped to egg-shaped and are hairless with smooth margins. Flowering stems are reddish and up to 2 feet long. They may be floating or lying on the ground. Flowers have five bright yellow petals, 0.4-0.6" long. The flowers occur on long stalks arising from the leaf axils.

Habitat

Water Primrose is native to parts of Australia, New Zealand, North America, and South America. It grows along freshwater shorelines and sprawls across the water's surface. It can tolerate water depths up to around 10 feet. Water Primrose can be found throughout California in rice fields, ditches, ponds, slow moving streams, and along edges of lakes and reservoirs.

Management

Water Primrose is well known as a troublesome aquatic noxious weed that invades water ecosystems and can clog waterways by forming very dense, virtually impenetrable mats which restrict fishing and boat access. When removing water primrose, be sure to remove as many plant fragments and roots as possible. Be sure to dispose of plants properly. Decomposing plants may cause a drop in dissolved oxygen.



Widgeon Grass

Ruppia maritima

Other names: ditch grass



1 mm

Native



0.01-2.0"



April-May



0.01-0.02" w, 2.4-4.1" l



Description

Widgeon Grass is a submersed aquatic perennial, often found in brackish water. It sprouts from slender, horizontal, underground stems and the above-ground stem forms many threadlike branches. It has slender leaves that are fused at the base, forming a sheath around the stem. In shallow water areas, Widgeon Grass 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 plant can have as many as 2 to 15 stem joints rooting on a stem. This species has a perennially submerged flower cluster. The seeds produced by Widgeon Grass are able to withstand long periods of drought and high salinities.

Habitat

Widgeon Grass is a widespread native with a nearly worldwide distribution. It is commonly found in seasonally and permanently flooded freshwater and marine wetlands. Widgeon Grass is very salt tolerant and able to recover after experiencing salinities of up to 44 mS/cm and survives 390 mS/cm. It is most commonly found in brackish ponds, marshes, and sloughs with water depths of 2 to 4 feet and at elevations below 250 feet.

Management

The plant is considered one of the most valuable food resources for migrating waterfowl. Large stands of Widgeon Grass can be wiped out by increased water turbidity or by completely drying out a pond bottom. Widgeon Grass grows best in calm, still waters and in areas with low turbulence. It can, however, withstand moderate currents and at times form robust stands under these conditions.

Alkali Heath

Frankenia salina

Other names: alkali seaheath



1 mm



native



0.3-2.0'



May-October



0.04-0.2" w, 0.3-0.6" l

Description

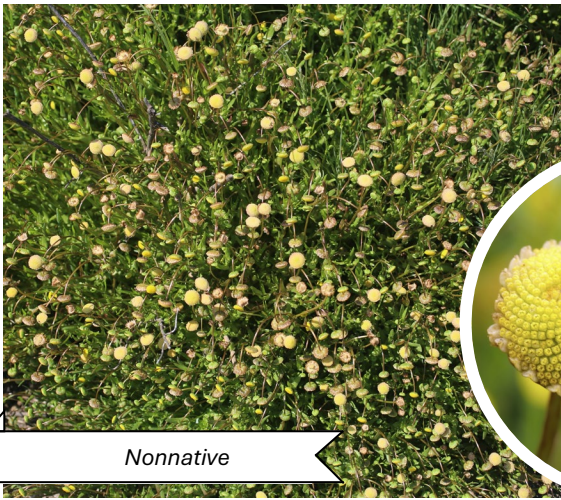
Alkali Heath is a small perennial herb that forms a dense twiggy thicket mat generally less than 6 feet in diameter. The flowers can be born singly or on a compound flower cluster on the uppermost stem/leaf angle. The stem is somewhat prostrate with twigs that can be with or without hairs. The flowers of this species can be white, pinkish, or blue. The leaves are light green and covered by fine hairs. It spreads by rhizome growth.

Habitat

Alkali Heath is a California native, commonly found on hypersaline salt marshes and alkaline flats at elevations of less than 2,500 feet. This plant tends to be found along the pond margins in the drier sites at higher elevations.

Management

Alkali Heath is considered to be only moderately valuable to wildlife, but it is one of the plants associated with the endangered salt marsh harvest mouse (*Reithrodontomys raviventris*) habitat. It is able to excrete salts and grows well in salt marshes and alkali flats.



Brass Buttons

Cotula coronopifolia

Other names: buttonweed,
golden buttons



0.2-1.3'



May-October



Leaf width, 0.3-2.8" l



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.

Habitat

Brass Buttons are commonly found in moist soil habitats, in fresh and salt-water marshes, and on both disturbed and undisturbed sites at elevation less than 1000 feet. It tolerates from 14-48 mS/cm salinities, and it is found on the edge of shallow ponds.

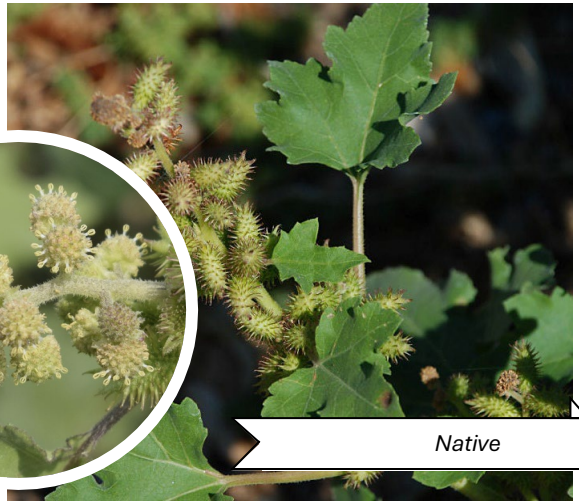
Management

If the soil remains moist, brass buttons will bloom year-round. It is a waterfowl food plant but less favored by green-winged teal (*Anas carolinensis*) and northern pintails (*Anas acuta*) and avoided by mallards (*Anas platyrhynchos*). 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 and grows best when submerged 2-4 months. After the pond is drained, the plants will develop normally.

Cocklebur

Xanthium strumarium

Other names: clotbur, common or rough cocklebur



Native



0.3-2.6'



July-October



1.2-3.9" w, 1.6-4.7" l



Description

Cockleburs are erect, annual herbs with a thick, fleshy stem. The stem is often spotted with red or black, and the leaves are broad, triangular, and hairy. Cockleburs are easily recognizable due to their large spiny fruits or "burs". The burs are green to yellowish in color on younger plants and turn brown at maturity. These burs are buoyant, allowing Cockleburs to disperse through waterways, but also hooked, allowing them to latch onto animals and disperse via translocation. Each bur contains one large and one small seed.

Habitat

Native to North, Central, and South America, this species is common in lower salinity wetlands throughout California.

Management

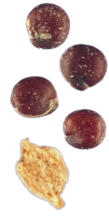
Cocklebur is an extremely competitive weed due to fast emergence and rapid growth supported by the large seed. Mowing or disking at flowering stage will control Cockleburs. Resprouts may occur after mowing and a secondary treatment may be required.



Fat Hen

Atriplex prostrata

Other names: creeping salt-brush, triangle orache



0.5 mm

Nonnative



0.1-3.3'



June-November



0.8-3.9" w, 0.8-3.9" l



Description

Fat Hen is an annual plant with more than one stem arising from the base. The leaf blade is roughly shaped like an arrowhead and are leathery. It produces abundant seeds.

Habitat

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 in areas higher than Brass Buttons. It is often found next to channels and on levee edges and may be one of the first to invade bare areas.

Management

Fat Hen is one of the most desirable waterfowl food plants. 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, drawdown should begin in late January or February as more than half of the seedlings emerge by mid-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*), but it can tolerate 20-77 mS/cm salinities. It is consumed by northern pintail in proportion to availability but less than the availability by green-winged teal and mallards.

Knotweed

Polygonum aviculare

Other names: doorweed,
oval-leaf knotweed



1 mm



Nonnative



0.3-3.3'



May-December



0.1-0.3" w, 0.3-1.1" l



Description

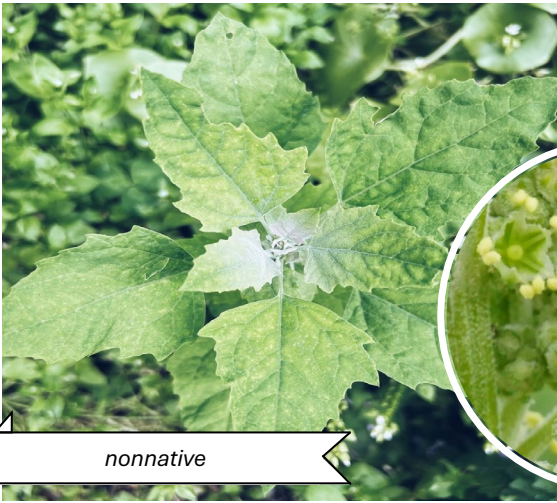
Knotweed is an annual herb with a semi-erect stem. The leaves are green or bluish green, hairless, and a long, elliptical shape with short stalks and rounded bases. Tepals are green or reddish brown, margins white, and veins unbranched.

Habitat

Knotweed is native to Europe and Eurasia. It is widely distributed, occurring in plant communities associated with water, including wetlands, wet meadows, and riparian or floodplain forests. It grows on lowland and levee habitats around wetlands in northern California.

Management

Knotweed establishes on disturbed sites. Mechanical methods are not usually effective if Knotweed control is desired, but they provide seeds consumed by ducks.



Lamb's Quarters

Chenopodium album

Other names: white goosefoot,
wild spinach, melde,
pigweed



1 mm



0.3-4.9'



June-October



3.0-6.0" l, 1.0-3.0" w



Description

Lamb's Quarters is an annual plant that is heavily branched. Leaves are generally light green to dark green, triangular egg shaped to lanced shaped. The leaf shape closely resembles that of Fat Hen (*Atriplex triangularis*) and will inhabit many of the same locations. Lamb's Quarters have a heavier stalk with thicker, more leathery leaves than Fat Hen.

Habitat

Native mostly to Europe, it is found throughout California up to an elevation of 5900 feet and inhabits agricultural land and other disturbed areas, including fallowed areas near marshes. It grows on pond bottoms and tolerates salinities of up to 62 mS/cm.

Management

Growth requirements for this plant are very similar to Fat Hen. Lamb's Quarters will typically grow on pond bottoms and germinate later in the year than Fat Hen.

Pickleweed

Salicornia pacifica

Other names: Virginia glasswort



0.3-2.3'



July-September



Leaf width, 0.8—3.1" l

Description

Pickleweed is a perennial or sub-shrub that spreads from rooting, horizontal, underground stems. 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. During the end of the growing season, as its segments accumulate salt and become briny, they will turn red and drop off the plant.

Habitat

Pickleweed is commonly found in salt marshes and alkali flats. The plant flourishes in both diked managed wetlands and upper tidal areas. It grows in salinities from 48-105 mS/cm.

Management

This plant is usually 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 reinhabit a high saline pond bottom after soil salts are leached out enough to support plant life. This plant provides very good invertebrate structure and the invertebrates can support many species of wildlife, especially the omnivorous waterfowl species such as wigeon (*Mareca americana*), gadwall (*Mareca strepera*), and northern shoveler (*Spatula clypeata*). Pickleweed is also a major component in the recovery of the salt marsh harvest mouse and is critical to its survival.

Rabbitsfoot Grass


*Polypogon
monspeliensis*

Other names: beard
grass



1 mm



 *nonnative, invasive*



0.7-3.3'



May - June



0.1-0.2" w, 0.4-8.1" l



Description

It 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 wide and flat with a compound flower that is up to 6 inches long. The flower is cluster, which is spike-like and very dense, is green early in the growing season and becomes white to yellow in colors as it matures. The unique shape and look of this flower cluster, resembling a rabbit's foot gives rise to its name.

Habitat

This annual grass originates from Mediterranean climates of southern and western Europe. This grass is indicative of seasonally or permanently saturated wetlands. Rabbitsfoot Grass can withstand brackish and sometimes saline conditions in areas of severe disturbance.

Management

Rabbitsfoot Grass is one of the most common grasses found throughout California's wetlands. Its seeds are eaten by ducks. Prescribed burning, tillage, and hand pulling are effective control methods as long as they are applied before inflorescences mature. It provides food and cover for waterfowl.

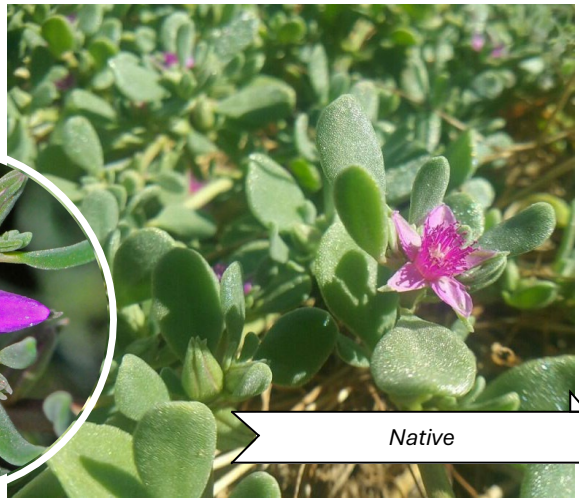
Sea Purslane

Sesuvium verrucosum

Other names: western sea purslane, verrucose sea purslane



1 mm



Native



6-12"



April-September



Leaf width, 0.2-1.6" l



Description

Sea Purslane is a low-lying annual fleshy 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, including waterfowl.

Habitat

Sea Purslane is native to the southern half of California east through southern Utah, Colorado, Kansas to Missouri, and south to Mexico. Sea Purslane is extremely salt tolerant, and will survive in soils with specific conductivity of up to 100 mS/cm. They typically occupy seasonally dry flats and margins of ponds that other plants may not occupy due to high salinities.

Management

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 degrade in the ponds in a matter of weeks after initial flood up. It is preferred by northern pintails and green-winged teal and eaten in proportion to availability by mallards.



Smartweed

Persicaria amphibia

Other names: water knotweed,
amphibious bistort



1 mm

Native



1.0-6.6'



July-October



8"l, 3"w



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 that may root. 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 contain a single brown or black seed.

Habitat

Most Smartweeds are plants of disturbed, moist areas. They are mostly found in the northern temperate areas of the world. Native varieties tend to grow partially immersed in shallow waters of marshes, swamps, wet forests or ditches. It grows best with soil salinities <5 mS/cm.

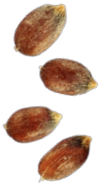
Management

Smartweed is considered a valuable waterfowl food plant and especially for northern pintails. 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, and soil salinities are typically <5 mS/cm.

Swamp Timothy

Crypsis schoenoides

Other names: swamp
pricklegrass, cowpond
grass



1 mm



nonnative



20" - 40"



June - October



0.125- 0.25" w, 2-8" l



Description

Swamp Timothy is an annual plant that can be prostrate, ascending, or erect. The leaf blades are short and narrowly lance-shaped. It is easily distinguished by its pink or purple stems and its mat-like distribution. Its clublike inflorescences are often found within sheaths and may exceed 1.25 inches in length.

Habitat

The native distribution of Swamp Timothy encompasses a large range including Africa, Europe, and Asia. It is tolerant of both temporary inundation and moderate to high soil salinity levels inherent in Central California wetland soils. It is commonly found in wet areas at elevations lower than 1,800 feet. It grows best in salinities <5 mS/cm and found in pond bottoms are late spring drainage.

Management

Swamp Timothy is an uncommon plant in the Suisun Marsh and can only be grown in the freshest water years. It usually grows in pond bottom areas where water is removed late in the spring. It is an excellent waterfowl food plant, especially for northern pintails and green-winged teal.

Watergrass

Echinochloa crusgalli

Other names: barnyard grass,
Japanese millet



2-6'



July-October



0.25-0.5" w, 2-6" l



Description

Watergrass is an annual grass with stems that can be either erect or reclining on the ground with ascending tips. The flower cluster can be either erect or nodding and has either one or two seed heads. Individual plants can produce up to 40,000 seeds per year. The flower clusters are about 6 inches long, are green to purple in color, and can be either loose or dense.

Habitat

Originating from tropical Asia, 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 area are favorable, Watergrass will germinate the following year from the previous year's seed crop. It is often associated with Smartweed.

Management

Watergrass seed should be planted in the late spring or early summer. The seeds are highly valued by mallards and northern pintails. 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. It may germinate anoxically and can do well in areas with late drawdown periods. Two irrigations (6 weeks apart) lasting 7 days is cost efficient for drawing down but longer irrigations (up to 28 days) result in improve seed production over a single 7- or 14-day irrigation. Mallards prefer Watergrass and it is eaten in proportion to availability by green-winged teal and northern pintails.

Alkali Bulrush

*Bolboschoenus
maritimus*

Other names: bayonet
grass, sea clubrush



2 mm



Native



1.6-6.6'



August-September



0.1-0.5" w, 9.8-15.7" l



Description

Alkali Bulrush is a stout, perennial herb that grows from long horizontal, underground stems. These large, fleshy stems are typically <0.75 inches wide. The aerial stems are upright and triangular with sharp angles and smooth sides and are approximately 0.25 inches wide and 2 to 36 inches tall. The leaves are evenly distributed along the stem. The seed head usually has at least 4 spikelets – some with many more. These seed heads are typically found as 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.

Habitat

This species is commonly found in coastal brackish and salt marshes throughout California at elevations less than 8,100 feet. Alkali Bulrush commonly occurs at lower pond elevations that are not level and is more abundant in the southwestern Suisun Marsh.

Management

Alkali Bulrush has been a primary food plant encouraged by waterfowl habitat managers; however, duck feeding trials suggest it may not provide much food value, since it has a hard seed coat. It is eaten in proportion to availability by mallards and northern pintails. It is a salt-tolerant species and will survive in environments with conductivity up to 42 mS/cm. Seven to eight months of submergence provide optimum growing conditions. Ponds should be drawn down to a mud flat in April or May, and 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 tolerates 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 the species.



Baltic Rush

Juncus balticus

Other names: wire grass



1 mm

Native



1.1-3.6'



May-June



Leaf 0.8-6"

Description

Baltic Rush is an unbranched, slender perennial with stout, needlelike, dark green leaves. This plant will invade new areas with creeping, underground, horizontal stems. The aerial stems can form small clusters or arise 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 5 to 50 individual flowers.

Habitat

Baltic Rush occurs throughout California to Alaska, eastern North America, and Eurasia. It grows in both upland and wetland habitats and can be found in both permanently and seasonally saturated soils of wet meadows and managed wetlands. The species is typically found at elevations less than 6500 feet.

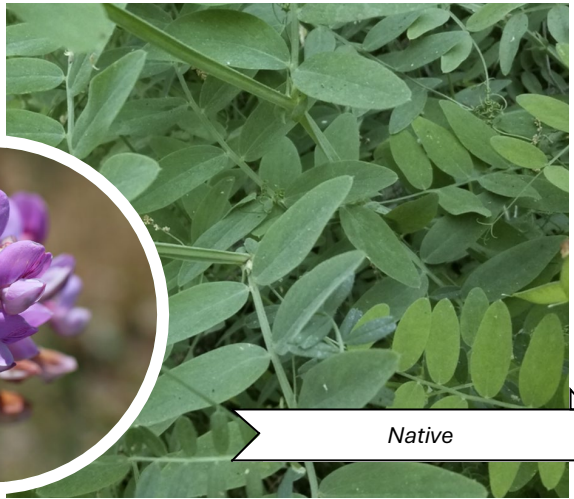
Management

Baltic Rush has little value as a waterfowl food plant. Burning can be an effective way to control undesirable plant species such as Baltic Rush. Control is best achieved if burned just prior to a flood-up period. The most effective kill occurs when the pond is immediately flooded over the unburned stalks. Burning without a follow up flooding period can allow the undesirable plants to rebound, in some cases stronger than before. Mowing can also be an effective habitat control measure. Once again, these plants can be drowned, and stands can be reduced if completely flooded after mowing.

Delta Tule Pea

Lathyrus jepsonii

Other names: Jepson's pea



1 mm



6.6-8.2'



May-July



Leaf width, 1.4-2.2" l



Description

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 purple.

Habitat

The Delta Tule Pea is a perennial herb that is native to California. This plant grows in the middle and high marsh zones of the tidal sloughs, channels, and tidal sides of exterior levees. The Delta Tule Pea is found at elevations of less than 75 feet.

Management

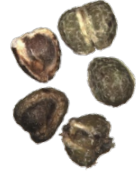
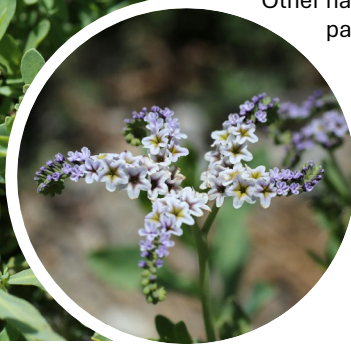
The Delta Tule Pea is a listed species of special concern and moderately threatened in California (Rare Plant Rank 1B.2). Of the several sensitive plants found in Suisun Marsh, Delta tule pea is the most common. Landowners will likely encounter the species on the exterior of levees and tidal berms.



Salt Heliotrope

*Heliotropium
curassavicum*

Other names: Chinese
parsley, seaside
heliotrope



1 mm



0.3-2.0'



May-June



Leaf width, 0.4-2.4" l

Description

Salt Heliotrope is a perennial herb that acts like a creeper plant and grows horizontally along the ground. The somewhat erect shrub has thick oval or spade-shaped leaves. The flowerhead is composed of curling, double rows of bell-shaped flowers. The flowers are white with a purple or yellow interior.

Habitat

Salt Heliotrope is a sprawling plant that is native to much of North and South America. It thrives in salty soils, alkali flats, and salt marshes. It is often found on disturbed sites, such as levees and roadsides.

Management

Salt Heliotrope is found in the transitional ecotone between the wetland marshes and the upland.

Saltgrass

Distichlis spicata

Other names: inland saltgrass, seashore saltgrass



1 mm



Native



0.3-2.6'



July-August



Leaf <3.9"

Description

Saltgrass is a low-growing perennial grass that forms from stout, yellowish, underground stems. The leaf blade is stiff and the flowerhead, or inflorescence, may be up to 3 inches long with green or purple spikelets. It excretes salts absorbed from its water source, and the salts are often found as crystals on the underside of the leaf blades.

Habitat

Saltgrass is found in brackish and salt marshes lower than 3,200 feet in elevation. It is commonly found on levees, roads, and upland margins.

Management

Saltgrass will form dense, monotypic mats with a thick duff layer below. This species prefers relatively high ground or pond margins which are inundated for about 4 months per year. The dense mats this species forms will allow it to out-compete many other plant species. It promotes mosquito production when ponds are flooded in the fall. It is resilient to burning with stands returning the following spring when germination conditions are suitable.



Suisun Marsh Aster

*Symphotrichum
lentum*

Other names:
Suisun Aster



1.3-4.9'



May - November



Leaf width, Up to 6" long

Description

Suisun Marsh Aster is a perennial, rhizomatous herb in the sunflower family. It produces a hairless stem with linear or lance-shaped, pointed leaves. The lower leaves wither by the time the plant flowers. The inflorescence is an open array of several flower heads with a fringe of purple ray flowers around a center of yellow disc flowers. It may be confused with two common asters: California Aster (*S. chilense* var. *chilense*) and Slim Aster (*S. divaricatum*). Suisun Marsh Aster has larger flowerheads (0.3-0.5) than Slim Aster (< 0.27 in). Suisun Marsh Aster has somewhat thick, succulent leaves, unlike California Aster. There are also invasive asters in Suisun Marsh, varieties of *S. subulatum*. These asters have much smaller flowerheads, similar in size to Slim Aster that bloom later in summer. They can be purple or white in color.

Habitat

In Suisun Marsh, it occurs along brackish sloughs affected by tidal fluctuations. It is found at or near the water's edge on the water side of marsh levees. It has been observed on the landward side of channel levees and along distribution ditches of managed wetlands. It may grow between rip-rap on levee slopes.

Management

Suisun Marsh Aster has no federal or state status, but it is listed as California Rare Plant Rank 1B.2. Suisun Marsh Aster may be threatened by marsh alterations and loss, trampling by livestock, damage by angler or hunter foot traffic, recreational water induced waves, levee repair and maintenance, replacement of installation of tide gates, competition from nonnative plants, herbicide use, and mowing.

Cattail

Typha latifolia

Other names: broadleaf
cattail, soft flag



1 mm



Native



3.3-9.8'



May-June



0.2-1.1" w



Description

Cattails are perennial, emergent monocots. The stems are upright and smooth with up to eight wide, elongate, and often enwrapped smooth leaves. Each plant produces a 6- to 12-inch cigar-shaped seed head that scatters downy airborne seeds in the fall. The seeds are elliptical in shape.

Habitat

In Suisun Marsh, cattails are one of the dominant plants in diked wetland acreage. Cattails are usually found along banks of sloughs and ditches and in permanently flooded ponds. They are found in fresher areas of the Marsh (up to 15 mS/cm salinity), in the eastern half or wherever freshwater is present from underground aquifers or seeps.

Management

Dense emergent cattail stands may provide food and cover for wildlife. Individual plants spread extensively from horizontal, underground stems so a large stand may consist of only one or two individual plants. Establishing new stands may be done by digging cattail clumps from elsewhere and floating them in the water. These clumps will settle in the pond margins, and the underground stems may become established. Planting bulbs may also introduce them into new areas. Cattails require a hydroperiod of greater than 9 months to thrive. Large stands of Cattails can reduce open water areas of wetlands – draining quickly on mudflats may reduce colonization. Mowing close to the ground in Aug-Sep and flooding >1 ft over the stubble from Oct-May can control them as well as systemic herbicides such as Glyphosate. Prior to flooding, stubble and litter may be burned. Other mechanical methods include cutting, crushing, and discing when the pistillate spikes are lime green.




Phragmites

Phragmites australis

Other names: Common Reed



 **nonnative, invasive**



6.6-16.4'



June-August



0.4-2.4" w, 7.1-23.6" l



Description (also, see the next page)

Phragmites is a perennial grass with a thick, creeping, horizontal, underground stem that can form dense stands. It has a thick stalk, and 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 can turn into long, silky hairs at maturity. These plume-like flower clusters will persist throughout the winter.

Habitat

Originating in Eurasia, the invasive *Phragmites* was introduced to the western United States in the early-19th century. Recent urban development and anthropogenic modifications have exacerbated its expansion, and it now occupies thousands of acres in Suisun Marsh. A native *Phragmites* subspecies (*Phragmites australis* spp. *americanus*) occurs in California, but the nonnative (*P. a. australis*) is considered the main subspecies in Suisun Marsh.

Management

Phragmites forms large monoculture stands in impoundments with stabilized water regimes. It spreads clonally via underground networks of rhizomes or via seeds, although seedling survival is considered to be low. A small piece of the rhizome can form a new plant with as few as two or three joints and is ~8 inches long. Invasive *Phragmites* are detrimental by reducing habitat connectivity and outcompeting important native plant species. Systemic herbicides are the most effective treatment for *Phragmites*. Roundup Pro® and Habitat® applied by both aerial and hand applications have had the best control results. Repeated treatment over multiple (2-3) years is required to effectively control *Phragmites* long-term.

Winter

Plant is dormant



Spring

Germination and growth

This is a good time to do a Spring burn to get rid of old dead stocks that protect new growth.



Seed shed

A Fall burn can be used to get rid of dead stocks and the viable seeds.



Continued growth, flowering and seed set

Mid to late summer is the time to spray herbicide. After stocks have died, it is good practice to mow dead stocks.



Fall

Summer


Russian Thistle

Salsola soda

Other names: opposite-leaved saltwort, barilla plant



4 mm

 *nonnative, invasive*



0.5-2.3'



July-October



Leaf width, 0.2-2.2" |



Description (also see the next page)

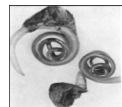
Russian Thistle is a large, bushy annual succulent shrub. Mature specimens are often more than 3 ft in diameter. Leaves are alternate and narrow. The upper leaves have a sharp point at the apex. When flowering occurs, pink to greenish flowers develop from the leaf axils. Each flower is subtended by 3, spine-tipped leaves.

Habitat

Russian Thistle is native to southern Europe and inhabits vernal pools, swamps, mudflats, and salt marshes. It may form dense stands in estuaries, especially in undisturbed salt marsh areas in the southern San Francisco Bay.

Management

After Russian Thistle matures it dries, hardens, and detaches from the root system. This detached anatomical part of the plant is called a "tumbleweed." This tumbleweed will tumble in the wind, spreading (possibly as many as 200,000) seeds. The seeds of this plant are not true seeds, they are little plant embryos ready to start growing (see picture below of embryo 30 min after water is added). The seeds of this plant can also float and survive in the water, so water can spread this plant as well. If it happens to come to rest in a wet area then it can germinate rapidly, even with very small amounts of moisture. It has a high tolerance of salinity and successfully competes with many native plants. This species will take a multi pronged approach to control. It can be sprayed in the spring when it is in its seedling stage but as it grows it puts on a cuticle layer and herbicides do not penetrate this layer. Hand pulling, mowing and flooding can be used together to control this species.



Winter

At this stage the plant is dead and detached from its root and is dispersing seed as the cycle starts over.

Spring

Early spring this plant looks almost grass like. This is the best time to spray Herbicide. By late spring the plant has developed a cuticle layer.



Early fall seeds becoming viable. Best practice is to pull the plant or flood it out. By late fall plant is dying and breaking off to disperse seed.

Early summer the plant is growing rapidly. This is the time to hand pull and mow. By late summer seeds are developing, mowing and flooding up after will reduce viable seeds.

Fall

Summer



Three-Corner Bulrush

Schoenoplectus americanus

Other names:
chairmaker's
bulrush, three-
square bulrush



1 mm



1.3-8.2'



May-July



0.1-0.3' w, 1.0-7.9" l

Description

Three-corner Bulrush is a perennial plant with long, horizontal, underground stems. Aerial stems are sharply triangular, 12 to 43 inches tall. Basal leaves up to 7 inches long are keeled and about 0.125 inches wide. The species often demonstrates a single leaf arising from just below the flower cluster. The flower cluster consists of 1 to 7 spikelets, each about 0.375 inches long, about 0.3 inch wide, and often in one stalkless cluster. The fruit is lens-shaped or triangular but weakly angled and about 0.375 inches long. The plant produces sexually via seeds and clonally spread via rhizomes.

Habitat

Three-corner Bulrush occurs in North, Central, and South America. It is widely distributed in wet ground; can grow in a variety of coastal and wetland habitats as well as sagebrush, desert scrub, plains, and chaparral.

Management

Three-corner Bulrush is one of the dominant plants in tidal acreage. It is a preferred food of muskrat, Canada and lesser snow geese, and habitat for the salt marsh harvest mouse, but it has limited food value for ducks.

Tule Bulrush

Schoenoplectus acutus

Other names: Hardstem bulrush



1 mm



Native



8-10'



May-August



0.1-2.8" w, 0.3-4.7" l

Description

Tules are long, slender, rod-like perennial emergent plants that can grow in water up to 4 feet deep. The leaves are basal sheaths that are approximately 3.1 inches in diameter and form large root balls. They reproduce primarily through underground vegetative rhizomes.

Habitat

Tules are found in both salt and freshwater marshes below 8,100 feet in elevation. Tules are most often found in dense stands along the shorelines of sloughs, ditches, and permanent ponds. Tules play an important ecological role as buffers against wind and water forces, protecting levees from erosion.

Management

Mature stands of tule can form large, floating clumps, which become detached from the main rootstalk and drift away to establish new areas. Tules require a hydroperiod of greater than 9 months in order to thrive. Tule patches tend to be stable and don't expand in seasonally managed wetlands in contrast with Cattails. Tules can be controlled by mowing close to the ground in August or September and flooding at least one foot over the tops of the stubble from October to May. Prior to flooding, the stubble and litter may be burned if feasible. It has low waterfowl food value.



Bird's- Foot Trefoil

Lotus corniculatus

Other names:
birdsfoot deer-
vetch, eggs and
bacon



1 mm

nonnative



12-24"



June-September



0.1-0.4" w, 0.1-0.9" l



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 and are linear or slightly larger above the middle in shape. Three leaflets are arranged oppositely at the base of the axis. The flower cluster is composed of 3 to 9 bright yellow flowers with or without some red, 0.3 to 0.5 inches long. Fruit is a capsule-like legume, 0.6 to 1 inch long, narrowly oblong, and opening at maturity.

Habitat

Bird's-foot Trefoil is native to Eurasia and North Africa. It is often found in open, seasonally wet flats and depressions that dry out by mid-summer. The species is also often found along roadsides. It is characteristic of many disturbed habitats in the Central Valley and California.

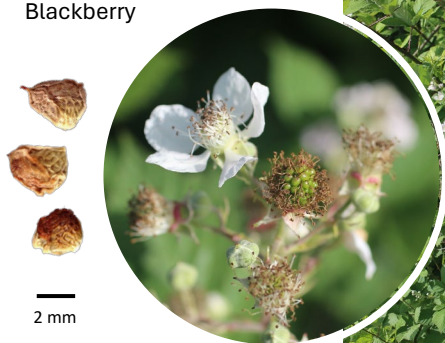
Management

Bird's-foot Trefoil is a choice food for Canada goose, deer, and elk. As ground cover, it provides green cover most of the year and blooms profusely. It is used for pheasant cover on shooting preserves and around ponds at duck clubs.

Blackberry

Rubus armeniacus

Other names: Himalayan
Blackberry



Up to 10'



April-August



1.2-4.7" l

Description

Blackberries are large, perennial shrubs 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, wider in the middle, and sharply toothed with white on the underside. Blackberries will produce white to pinkish flowers and a dark reddish edible fruit. Native Pacific Blackberry (*Rubus ursinus*) may also occur in some areas of Suisun Marsh. They differ in the stem (angled stems for Himalayan, round stems for Pacific) and leaf growth (3-5 leaflets in Himalayan, ≤ 3 for Pacific).

Habitat

This species is native to Armenia and Northern Iran. Blackberries form dense thickets on moist, elevated areas such as levees, roadsides, and stream banks in moist soil. Blackberries are most commonly found at elevations less than 5200 feet.

Management

This plant is excellent at stabilizing slough banks. Blackberry provides cover and food for wildlife, including passerines. This species is on the 1999 California Invasive Plant Council's (Cal-IPC) List A-1: most invasive wildland pest plants; widespread. All blackberry species can be controlled by mowing back or spraying with Garlon (triclopyr).




Bristly Oxtongue

*Helminthotheca
echioides*

Other names:
prickly
oxtongue



1 mm

 *nonnative, invasive*



1.0-6.6'



June-December



0.4-3.1" w, 2.0-7.9" l

Description

Bristly Oxtongue is an annual plant that has milky sap. The entire plant bears rigid hairs and scattered prickles. The leaves are 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 and bear a white, cottony plume to aid in wind dispersal.

Habitat

A common weed of fallow areas or agricultural soils at elevations of under 450 feet, Bristly Oxtongue can often be found in disturbed areas (especially roadsides).

Management

Remove it by hand pulling, string trimming or hoeing when soil is moist. Roots two inches below the surface must be removed to insure they won't regrow. Repeated mowing may suppress plants, but they may grow back if mowing is ended.

Cheeseweed

Malva parviflora

Other names: mallow, little mallow,



nonnative, invasive



1.6-2.6'



Year-round



0.2-0.3" diameter



Description

Cheeseweed is a sprawling herb with broad leaves that have 5 to 7 shallow lobes. The lobes edges are round toothed, with varying hairiness. Stems are tough and woody and grow mostly erect. It has small white or pink flowers that bloom nearly year-round. The fruiting head resembles a wheel of cheese with wedge-shaped sections.

Habitat

Native to Northern Africa, Europe, and Asia, Cheeseweed is widely naturalized elsewhere and is found throughout California. It typically grows on agricultural lands in disturbed sites such as roadsides.

Management

Cheeseweed may contain nitrate concentrations toxic to cattle. It may reduce the quality of eggs when eaten by poultry. It may be invasive in certain regions.



Coyote Brush

Baccharis pilularis

Other names: chaparral broom, bush baccharis



1 mm

Native



0.5-15'



September-January



0.1-0.6" w, 0.2-1.6" l

Description

Coyote Brush is a large, woody shrub that is native to California. 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.

Habitat

Coyote Brush is commonly found on the upland fields and levee tops throughout Suisun Marsh.

Management

Pruning rejuvenates the plant and prevents fire hazard. Coyote Brush provides dense canopy and shelter for rodents, rabbits, birds, as well as other plants.

Curly Dock

Rumex crispus

Other names: curled dock,
yellow dock



1 mm



 *nonnative, invasive*



1.3-4.9'



Year-round



0.8-2.4' w, 5.9-12" l

Description

Curly Dock is a stout, perennial herb. The leaves are lance-shaped with a margin that is strongly curled, especially near the base. The flowers and seeds are produced in clusters on branched stems. 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.

Habitat

A native of Europe, Curly Dock is a very conspicuous exotic weed community found on disturbed sites throughout California's wetlands, especially on roadsides, railway beds, or car parks. It is common and widespread in wet or moist meadows, flats, and shallow marshes of fresh and brackish water.

Management

Curly Dock is not thought to be a food source used by waterfowl. This plant can tolerate a wide range of flooding regimes and soil chemistries. It is difficult to control by hand-pulling because of their deep taproot. Continual mowing before seeding can be effective in reducing seed production.





Saltmarsh Dodder

Cuscuta salina

Other names:
goldenthread,
salt flats dodder



1 mm



0.3-1m



May-October



N/A

Description

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's tissues. It is mostly stem, with twining yellow or orange vine-like shoots that are sometimes tinged with purple or red and eventually create a tangled mat. The stem can be both thin and threadlike or very stout. Flowers are typically white. The leaves are reduced to scales on the stem's surface, since they are not needed for photosynthesis while the Dodder obtains nutrients from its host.

Growing several inches a day, a single Dodder can soon become a dense mat. 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, the seed can remain dormant for up to five years. If the seed does begin to germinate, the seedling must make contact with a host within a few days or it will die.

Habitat

Dodder species are found throughout California up to an elevation of 8200 ft. Dodder are variable in the habitat they found in naturally and the number of different host species they can infect, with some restricted to just a few host plant species and others able to infect a wide range of hosts. *C. salina*'s host plants include Pickleweed, *Jaumea*, and Alkali Health.

Management

There are no management options for Dodder.

Fennel

Foeniculum vulgare

Other names: sweet fennel, finocchio



3 mm



3.0.-6.6'



May-September



0.02" w, 12-16" l

Description

Fennel is a perennial plant with an erect and branching stem. This species has a strong black licorice scent, and the seeds are often harvested as a spice. Its leaves are triangular 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. Younger Fennel plants may be confused with Hemlock, but Fennel has fine, thready leaves while Hemlock has triangular shaped lacy leaves.

Habitat

Indigenous to the shores of the Mediterranean, 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.

Management

Fennel can be mowed to improve visibility on roadsides and levees.



Fireweed

Bassia hyssopifolia

Other names: *Bassia*, ragweed summer-cypress, kochia



1 mm

Native



0.6-3.9'



August-November



0.3-2.0" w, 0.3-2.0" l

Description

Fireweed is a large annual herb that has a shrublike appearance. Stems are often multi-branched with short leaves. The dry fruit of this species has a single seed. The seeds are dispersed by wind and water, and like a tumbleweed, the plant will detach from the ground and roll. Without closer inspection, Fireweed bears some resemblance to Alkali Heath (*Frankenia salina*).

Habitat

This species is primarily found in grassland, prairie, and desert shrub ecosystems. It likes saline soils and can rapidly colonize new locations and suppress other vegetation. In Suisun Marsh, Mexican Fireweed can be found in disturbed areas, primarily levee tops.

Management

The species can quickly develop resistance to herbicide. In other areas, fireweed has been used to control erosion on degrading soils.

Giant Reed

Arundo donax

Other names: arundo, elephant grass, giant cane



6.6- 33'



May-June



0.8-2.4" w, 39" l

Description

Giant Reed is a tall, erect perennial cane or reed-like grass. The leaves are two-ranked, wide at the base and taper to a point. The flowers are large plume-like terminal compound clusters that appear between March and September.

Habitat

Native to the Middle East, these plants will grow best in well-drained soils where abundant moisture is readily available. This plant does not produce a very viable seed; establishment in most areas is due to transplanting by people.

Management

Reproduction is driven by underground rhizomes that form knotty, spreading mats that penetrate deep into the soil. Due to this reproductive strategy, giant reed is considered well-adapted to flooding. 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.



Creeping Wild Rye

Leymus triticoides



Other names:
beardless
wild rye



5 mm



1.5-4.1'



June – July



0.1-0.2" w, 0.4-1.4" l

Description

Creeping Wild Rye is a perennial, usually with extensive creeping, horizontal, underground stems. Aerial stems are found as individuals or in small clusters, about 0.375 of an inch in diameter. Leaf blades are flat and are rarely hairy. The flower cluster or inflorescence is a narrow 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. Creeping Wild Rye will form solid root systems, allowing it to flourish along water's edge and prevent soil erosion.

Habitat

Widely distributed throughout California, except in the deserts, and found in the mountains up to elevations of about 7,500 feet. Creeping wild rye frequents the dried or moist edges of meadows and flats – usually in heavy, often alkaline soil – while also flourishing as a weed in waste places of the western U.S.

Management

This species is exceptionally aggressive in its growth habit in most conditions so should only be used in areas with a lot of space and/or in an appropriate setting (i.e. restoration, erosion control, etc.). Its vigorous spreading character can take over wide areas rapidly. High concentrations of salts and/or low levels of moisture result in poorer stand establishment and slower growth rates.

Foxtail

Hordeum murinum

Other names: wall barley, wild barley, mouse barley



1 cm



nonnative, invasive



1.6-12'



March-April



0.1-0.2" w, 11" l



Description

Foxtail or Wall Barley is an annual grass 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.

Habitat

This plant is found most often in disturbed sites at elevations less than 6,500 feet. It requires fresher water and may require precipitation for growth.

Management

Like most grasses, barley needs little management once established in a field. Many barley species are aggressive weeds and can quickly dominate areas. Occasional mowing, burning, or discing may be required to maintain the field in an early stage of succession where this plant will thrive. Ducks may eat the seeds early in the fall prior to floodup, and the grass provides cover.




Harding Grass

Phalaris aquatica

Other names: bulbous
canarygrass



2 mm

 *nonnative*



1.3-6.6'



February-March



0.2-0.4" w, 5.9-24" l



Description

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

Habitat

Harding Grass is native to Mediterranean Europe. It is widespread in California because it has been used as a forage species and for revegetating after fires. This plant is most commonly found in disturbed sites at elevations of less than 5,000 feet.

Management

Like most grasses, Harding Grass will need little management once established. Occasional mowing, burning, or discing may be required to maintain the field in an early stage of succession to provide cover for ground-nesting birds.

Italian Rye Grass

Festuca perennis

Other names: annual
ryegrass



! nonnative, invasive



1.6-3.3'



May - September



0.04-0.2" w, 1.6-12" l



Description

Italian Rye Grass provide important nesting cover for ground nesting bird species in Suisun Marsh. Italian Rye Grass can be considered annual or biennial depending on climate and/or length of growing season. Stems grow singly or in clumps and rounded to slightly flattened. Leaf blades are flat, glossy and generally hairless. The flowerhead consists of small, stalkless spikelets that are alternate to one another along the main flowering stem. Seeds are shown in bracts.

Habitat

Italian Rye Grass is native to the Mediterranean region, including southern Europe, southwest Asia, and north Africa. Italian Rye Grass prefers areas with fertile, well drained soils It harsh winters or hot, dry summers. Rye grasses are very common on sites at elevations of less than 3,200 feet.

Management

Italian Rye Grass requires little management once it has become established in the 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. It provides food for waterfowl an is used by ground-nesting birds for nesting cover in the spring.



Ripgut Brome

Bromus diandrus

Other names: ripgut grass,
brome grass, great
brome



0.5-3.9'



April-June



0.1-0.3" w, 3.9-9.8" l

Description

Ripgut Brome is an upright, annual grass with rigid or stiff stems, leaves, and panicles. The erect panicle has short branches that terminate in four to nine flowered spikelets. Spikelets may be whitish-green or purplish. Ripgut brome has long, droopy leaves and distinct flowerheads with long awns (15 – 60 mm).

Habitat

Native to Europe, northern Africa, and western Asia it has been widely introduced around the world, including in North America. It is commonly found throughout California in man-made or disturbed habitats, roadsides, meadows, and fields. They are tolerant of drought, low-nutrient soils, and cold temperatures.

Management

Ripgut Brome becomes very dry and flammable during the dry season, increasing wildfire frequency which can lead to conversion of shrubland and woodland to grassland. They are common in upland nesting fields. Brome seeds may spread great distances via water and soil movement and by clinging to animals and people. Populations too large for manual removal can be managed by cautious application of herbicides.

Tall Wheatgrass

Elymus ponticus

Other names: rush wheatgrass



1.6-7.2'



June-July



0.08-0.3" w, 7.9-18" l



Description

Tall Wheatgrass is a perennial tall-growing, coarse-textured bunchgrass. It 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 the stems of this species are erect.

Habitat

Tall Wheatgrass is native to Eastern Mediterranean Region. In Suisun Marsh, it is commonly found on disturbed sites. Tall Wheatgrass is especially tolerant of saline soils. This plant is most commonly found at elevations of less than 5,000 feet.

Management

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. It provides food and cover for nesting birds.



Wild Oat

Avena fatua

Other names: oatgrass, spring wild oat



3 mm



1.0-5.2'



April-May



0.1-0.6" w, 3.9-18" l



Description

This winter annual grass has a stout erect stem and numerous flat leaf blades, or spikelets. The long dark green leaves are rough due to small hairs. This grass generally has many slender horizontal branches supporting numerous flower clusters.

Habitat

Native to Eurasia, wild oats are found on both cultivated soils and open fields. This grass is commonly found in disturbed sites at elevations less than 3,600 feet.

Management

Like most grasses, wild oats need little management once established. Occasional mowing, burning, or discing may be required to maintain the field in an early stage of succession where this plant will thrive. It provides cover for wildlife and food for ungulates.

Hemlock

Conium maculatum

Other names: poison hemlock



2 mm



1.6-10'



April-September



2.4-11" w, 5.9-11.8" l

Description

This species of biennial plant contains highly toxic alkaloids that will kill humans and animals if eaten. The stems are erect and are green with a purple spotting running its length. The leaf blade is triangular with serrated edges 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 fennel and are compressed side to side with ridges running along the length. The toxins can be found throughout the entire plant and produce a strong mousy odor when bruised. The most distinguishing feature between poison hemlock and fennel is the lack of purple spotting on the stems of fennel.

Habitat

Hemlock is native to Europe and was brought to North America as an ornamental plant. It is very common on moist soils especially on disturbed sites near roadsides and levee tops. Hemlock will thrive in disturbed areas.

Management

Hemlock can be fatal to humans and other animals if eaten. It can be controlled by applying glyphosate (Roundup® or Aquamaster™).




Ice Plant

Carpobrotus edulis

Other names: sea fig



2 mm

 nonnative, invasive



0.3'



February-October



0.04-0.2" w, 2.0-4.3" l



Description

Ice Plant is a creeping, mat-forming succulent species. The species grows year-round, with individual segments that can grow up to 3 feet per year. Individual Ice Plants can spread up to 165 feet in diameter. Its leaves are a dull-green or yellow-green color, are slightly curved, and have serrated edges near the tip. Its yellow or white flowers are produced in spring and summer and can grow as large as 6 inches in diameter. *C. edulis* is often confused with the similar sea fig (*C. chilensis*), which produces slightly smaller flowers that are typically deep pink. Both *C. edulis* and *C. chilensis* can be found in Suisun Marsh.

Habitat

Ice Plant is native to South Africa which has a coastal climate similar to California. In Suisun Marsh, Ice Plant can be seen on the banks of levees and may serve as some form of reinforcement.

Management

Ice Plant are very adept at colonizing disturbed areas, and it can make walking on levees difficult. Ice Plant is easily removed by hand-pulling, but all live shoot segments must be removed from contact with the soil to prevent resprouting. Mechanical removal by bobcat or tract is efficient for areas in which there are no sensitive resources. Because of the high-water content of shoot tissues, burning of live or dead plants is not a useful method of control or disposal.

Marsh Gumplant

Grindelia stricta

Other names: coastal gumplant, gumweed



3.3-6.6'



May-October



0.4-5.9" l

Description

Marsh Gumplant is a shrubby perennial with stems both reclining and erect. Basal leaves are tapered and larger than stem leaves. Flower clusters are generally gummy or sticky with somewhat hemispheric heads 1 to many in number. The yellow ray flowers of this species typically number 30 to 60, while the yellow disk flowers are numerous. There are two taxa found in San Francisco considered special status species.

Habitat

Marsh Gumplant is found in shallow saltwater and brackish marshes within the peripheral halophyte zone, below elevations of 1700 feet. The species occurs in these wetlands throughout the North Coast Ranges, extending to Alaska. In the San Francisco estuary, it is commonly found along channels edges or levees.

Management

Marsh Gumplant is a great source of food and habitat for many animals that live in the tidal marsh. The Ridgway's Rail (*Rallus obsoletus*) uses the plant's stems and leaf canopies as scaffolding for its nests and it also provides food for many marsh pollinators and other animals including the endangered Salt Marsh Harvest Mouse.



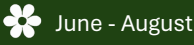
Narrowleaf Milkweed

Asclepias fascicularis

Other names: Mexican whorled milkweed



1 mm



Description

Narrowleaf Milkweed is a perennial herb with many thin, erect stems bearing distinctive long, green, pointed leaves which are very narrow and often whorled about the stem. Ball-shaped flower clusters are comprised of many white to light pink flowers. Exuding a delicious vanilla scent, the milkweed also attracts many pollinators while in bloom.

Habitat

Narrowleaf Milkweed is a western native species commonly found in the Western United States and Baja California. It is native to many habitats and conditions across all of California. It grows in a wide range of soils. It is drought tolerant and prefers well-drained soils.

Management

This Milkweed and its allies are considered to be incredibly important to Monarch Butterflies, especially in California and other western states where it is native. Narrowleaf Milkweed is a nectar source and the sole source of food for the Monarch Butterflies which obtain alkaloids by consuming them that deter predators. Monarchs lay their eggs exclusively on Milkweed and the butterfly caterpillars feed on the plant.

Pampas Grass

Cortaderia selloana

Other names: N/A



! nonnative, invasive



6.6-13'



September-March



0.1-10.5" w, 20-79" l



Description

Pampas Grass is a large perennial tussock-forming grass with abrasive leaf blades that grow in large, impenetrable clumps. The plumes are large and silky, range from white to pink, and each produces up to 100,000 seeds. 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.

Habitat

Originating in South America, Pampas Grass is effective at colonizing bare ground, but struggles where its seedlings must compete with other existing grasses or hedges.

Management

This plant may rapidly colonize an area and is invasive in drains, firebreaks, and logged and burned sites. Once established, however, Pampas Grass will outcompete and smother native plants with an impressive ability to hoard resources such as shade, sunlight, and ground nutrients.



Perennial Pepperweed


Lepidium latifolium

Other names: perennial
pepperweed, tall
whitetop



1 mm



 *nonnative, invasive*



1-5'



May-July



1-2" w, 4-12" l



Description (also see the next page)

Perennial Pepperweed is a perennial shrub with white flowers. The leaves arise from the base and have a toothed margin. This plant regenerates primarily from horizontal, underground stems and can quickly take over a disturbed area. This root network can reach as deep as 9 feet and constitutes 40% of the biomass of the plant.

Habitat

Perennial Pepperweed is a herb native to Europe and western Asia that was introduced, perhaps accidentally, into North America. It is usually found in dense patches. In Suisun Marsh, it is commonly found in saline soils and disturbed sites such as levee slopes, pond edges, and upland areas.

Management

The most effective treatment for Perennial Pepperweed is the application of Telar XP® or other broadleaf selective herbicide. This species can spread through clippings; therefore, mowing and disking stands is not a recommended treatment option. Spraying is done in the late spring when the plant has developed buds but before it flowers. This is usually late April or early May. The stalks will die off on their own but what you are trying to kill is the underground stems to control this plant.

Winter

Aboveground plant dies in early winter. Late winter early spring you start seeing the basal rosette.

Spring

Basal rosette, new shoots, plants begin to flower late spring. Mid to late spring is the best time to spray.



Sets seed

Continued growth, flowering. Can still be sprayed at this time before it sets seed in late summer.

Fall

Summer



Purple Vetch

Vicia benghalensis

Other names: reddish tufted vetch



3 mm

Native



3.3-6.6'



March-June



0.6-1.2" l



Description

Purple Vetch is a vine-like, non-woody member of the legume family with leaves on its tendrils that will cling to other plants. The flowers can be purple, white, or yellow, depending on the species. 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 elongated axis with four to many leaflets arranged along either side. Purple Vetch can be considered both an annual and a biennial and is more of a succulent than Lana Vetch. .

Habitat

Vetch is native to Europe, North America, South America, Asia and Africa. It is a common understory plant in many types of habitats and provides forage for wild and domesticated animals. It is drought-tolerant and thrives in both dry and moist habitats.

Management

This plant is important to breeding waterfowl and other species of ground-nesting wildlife as cover. When planting similar Lana Vetch (*V. villosa*), 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 inches deep. Covering the seeds by drilling will improve the stand during the first few years of growth and will yield better results than broadcast seeding 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.

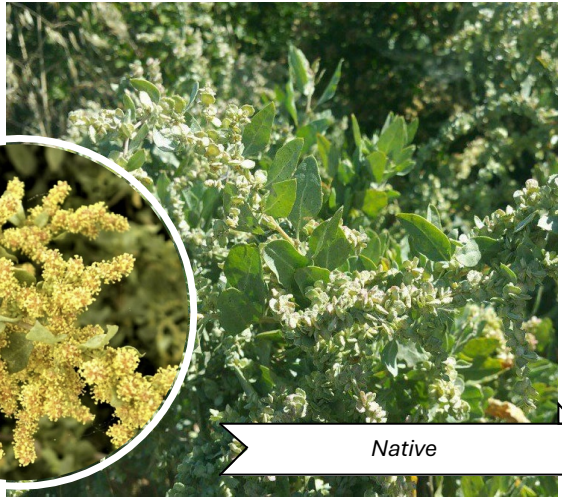
Quail Brush

Atriplex lentiformis

Other names: big saltbrush, lenscale, white thistle



2 mm



Native



3.3-8.2'



June-July



0.2-2.0" w, 0.2-2.0" l

Description

Quail Brush is a large plant that will generally be wider than it is tall (see picture below). The leaves are oblong to oval 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. During the winter months some individuals of this species may become dormant appearing to have died.

Habitat

Quail Brush is a native shrub that tends to grow in wetlands at elevations from sea level to 5,000 feet, although it may also be found outside of wetlands.

Management

Quail Brush is commonly found on the upland fields and levee tops throughout the marsh. It tolerates a variety of soils and although it is drought tolerant, a source of underground water is preferred.






Salt Cedar

Tamarix chinensis

Other names: Chinese tamarisk,
five-stamen tamarisk



0.5 mm

 *nonnative, invasive*



9.8-26'



March-November



Leaf width, 0.06-0.1" l



Description

Salt Cedar may grow as a tree with a single trunk or as a shrub with several spreading erect branches. It has reddish, brown, or black bark. The leaves are gray-green in color and have salt glands. Salt crystals can often be seen on the leaves. Small flowers are densely arranged on racemes. Salt Cedar produces thousands of flowers in the spring and the summer. Each fragrant flower has five petals which are usually pink but range from white to deep pink.

Habitat

Native to China and Korea, Salt Cedar easily inhabits moist habitats with saline soils and has taken over a number of rivers and wetlands, particularly in arid and semi-arid regions, in California.

Management

Salt Cedar has become an aggressive invader of wildlands in the southwestern United States where it was once planted as an ornamental plant. Individual plants can produce 500,000 tiny seeds per year, which are easily dispersed long distances by wind and water. Salt Cedar is difficult to kill with mechanical methods, and it resprouts vigorously following cutting or burning. Root plowing and cutting are effective ways to clear heavy infestations, but these methods are only successful when combined with follow-up treatment with herbicide.

Scotch Broom

Cytisus scoparius

Other names: common broom



2 mm



! nonnative, invasive



6.6-8.2'



March-May



0.06-0.3" w, 0.2-0.8" l



Description

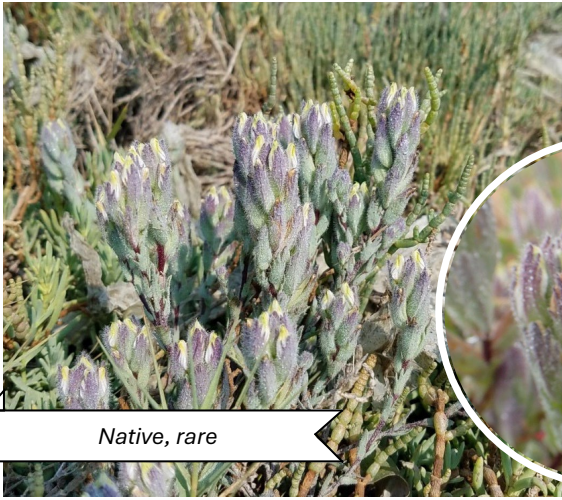
Scotch Broom is a bushy, drought-deciduous shrub with green branches that are sharply angled with five green ridges. The branches are hairy when young, but without hairs as they mature. Leaves occur in groups of three. Each leaf is oblong and pointed at both ends. During drought, Scotch Broom will shed its leaves. It is notable for its bright yellow, pea-like flowers and its bunches of unusual, angular stems. A related species, French Broom (*Genista monspessulana*) is related nonnative invasive plant that is abundant in Marin County. Scotch Broom has 5-angled stems while French Broom has 8-angled stems, and Scotch Broom appears wiry with smaller and fewer leaves, while French Broom has smaller flowers that are lighter in color.

Habitat

Native to northern Africa and parts of Europe, Scotch Broom was introduced to California as an ornamental. Scotch Broom has a high tolerance for most soils conditions, as a result of its ability to fix nitrogen from the atmosphere. Scotch Broom invades dry hillsides, pastures, forest clearings, dry scrublands, dry riverbeds, and waterways.

Management

Young Scotch Broom can be eradicated by hand pulling, if the infestation is relatively small. Mowing is also effective when the plant is under drought stress. Cutting Scotch Broom shrubs to ground level at the end of the dry season can help reduce resprouting from the crown. Care should be taken to minimize soil disturbance as much as possible. There are many herbicides available to control Scotch Broom.



Soft Bird's Beak

Chloropyron molle
ssp. molle



Native, rare



3.9-16"



June-September



Leaf width, 0.4-1" l



Description

Soft Bird's Beak is a grayish or purplish green annual herb. The plant is characterized by its woolly inflorescence, or flowerhead, that is covered with small, shiny, bristly white hairs. The purple-green sepals that contain the flowerhead surround small, yellow or white flowers. Soft Bird's Beak is hemi-parasitic and receives some of its nutrients from other plants such as Saltgrass (*Distichlis spicata*) and Pickleweed (*Salicornia pacifica*).

Habitat

This species is endemic to the North Bay marshes. It grows in tidal coastal salt and brackish marshes, commonly in the marsh/upland transition zone. It can be found in alkaline and saline soils. A natural hydrologic connection to a tidal slough system is an important habitat requirement for this species. Soft Bird's Beak is found only in the coastal marshes of the San Francisco Bay Estuary. Suisun Marsh is a stronghold for Soft Bird's Beak.

Management

This plant is federally listed as an endangered species and State listed as "Rare" in tidal wetland habitats.

Artichoke Thistle


Cynara cardunculus

Other names: cardoon,
wild artichoke



3 mm



 *nonnative, invasive*



1.0-8.2'



April-July



Leaf width, 0.1-0.8" l

Description

Artichoke Thistle is an herbaceous perennial plant that is characterized by its large flowerhead with green or yellow spikes, and a pink or purple flower that can be up to 2 inches in diameter. Its leaves are lobed, green, hairy, and spiky.

Habitat

Originating in the Mediterranean, Artichoke Thistle has adapted to dry climates. In Suisun Marsh, it can be found in disturbed areas, particularly along roadsides or levees.

Management

For manual control of established plants, a large portion of the taproot must be removed, otherwise the remaining root will generate new shoots. Cutting flower stems before maturity can reduce seed production.



Bull Thistle

Cirsium vulgare

Other names: spear thistle,
common thistle



1 mm



nonnative, invasive



0.1-0.8'



June-September



2.4-5.9" w, 2.4-16" l

Description

Bull Thistles are perennials that are sometimes short-lived, often dying after flowering only once. These thistles have erect stems and leaves that are tapered. Bull Thistle is the only thistle that has spines on the surface of the leaf. Floral heads range in color from pink to purple and are 1-2 inch in diameter. This species closely resembles the endangered Suisun Thistle.

Habitat

Native to Europe, western Asia, and northern Africa, Bull Thistle is now currently found in all 50 states. Bull Thistle is widespread in California and is common along edges of fresh and brackish marshes.

Management

Bull Thistles are adept at colonizing bare and disturbed areas. They can also flourish on heavily grazed lands. Bull Thistle reproduces entirely by seed, so a successful management program must focus on preventing seed production. Small infestations can be effectively hand-pulled or dug up. Mowing is effective in preventing seeding out. Individual Bull Thistle plants can be physically removed by cutting below the crown in early spring prior to bolting and flowering to prevent seed development and distribution. Thistles that are actively growing and in the rosette to flower stage of growth can be controlled with a post emergent herbicide application. A surfactant should be used due to the hairy leaf surface.

Italian Thistle

Carduus

pycnoccephalus

Other names:

Plymouth
thistle



! nonnative, invasive



0.6-6.6'



February-July



2.4-5.9" l

Description

Italian Thistle is an annual herb with prickly leaves and stems with prickly wings. These thistles produce purple to pink, rarely white, flowers in summer. Flower heads typically occur in clusters of 2-5.

Habitat

Native to the Mediterranean region, Italian Thistle is widespread in California. It is widely distributed in disturbed open sites, roadsides, pastures, annual grasslands, and waste areas. Italian Thistle can grow densely, crowding out other vegetation with dense rosette 'colonies' in the winter, thereby preventing establishment of native plants.

Management

Hand pulling can be used for small patches, but these thistles form deep taproots, and the root must be severed at least four inches below ground level so the plant does not regrow. Plants should be pulled well before seed is set. Mowing is not reliable because plants can regrow and still produce seed. Chemical control can be achieved with a variety of products, but their use is not always appropriate, especially near water surfaces and other sensitive natural habitats. Seed heads should be removed from the site and bagged or burned.



Milk Thistle

Silybum marianum

Other names: blessed thistle, variegated thistle



3 mm



0.6-10'



April-July



3.9-12" w, 5.9-24" l

Description

Milk Thistle is a perennial that is sometimes short-lived, often dying after flowering only once. These thistles have erect stems and leaves that are tapered. Thistles are known for the spines on their leaves and floral heads. The floral heads have a 1-2 inch diameter. Milk Thistles have one large, pink-purple flower per stem surrounded by sharp, spiny bracts. These species closely resemble the endangered Suisun Thistle.

Habitat

Native to the Mediterranean, Milk Thistles are commonly found in disturbed areas, fields, pastures, meadows, and roadsides.

Management

Milk Thistles are adept at colonizing bare and disturbed areas. They can also flourish on heavily grazed lands. Seeds are dispersed by wind, mud, and water, and therefore make these thistles effective spreaders. Some seeds can remain dormant in soil for up to four years.

Purple Star Thistle

Centaurea calcitrapa

Other names: red star thistle



1 mm



! nonnative, invasive



0.6-3.3'



July-October



3.9-7.8" l



Description

Purple star thistle is an annual or perennial plant with deeply lobed, resin-dotted leaves. It is characterized by the spiny, scale-like leaves that protrude from beneath the purple composite flower head in a star-like arrangement.

Habitat

Purple star thistle is native to the Mediterranean, southern Europe, and northern Africa. It inhabits highly disturbed areas, such as along roadsides and levees, and can tolerate a wide range of soil moisture conditions.

Management

This plant is extremely aggressive, dominating native plants and choking out fragile ecosystems. Unmanaged populations threaten the quality of grazing lands, thrive in healthy, moist soils, reduce forage production and decrease the overall health of native plants. Small infestations can be controlled by digging, especially before seed production. Mowing encourages extra growth of the plant and should be avoided. Some herbicides can be effective such as aminocyclopyrachlor, Milestone, Dicamba, or Glyphosate.



Yellow Star Thistle

Centaurea solstitialis

Other names:
yellow cockspur,
Barnaby thistle



1 mm



nonnative, invasive



0.3-3.3'



April-September



0.4-5.9" l



Description

Yellow Star Thistle is a bushy, winter annual plant with rough, bristly, lobed leaves. Plants are gray-green to blue-green and have deep taproots. Its composite flowers are heads made up of many yellow flower with spiny scale-like leaves.

Habitat

Native to the Mediterranean region, yellow starthistle was introduced to North America in contaminated seed. Yellow Star Thistle has invaded 12 million acres in California and inhabits open hills, grasslands, open woodlands, fields, roadsides, and rangelands. Disturbances created by cultivation, poorly timed mowing, road building and maintenance, and overgrazing favor this rapid colonizer.

Management

Yellow Star Thistle is one of the most serious weed species in the state. It propagates rapidly by seed, and a large plant can produce nearly 75,000 seeds. Several insects from the Mediterranean region, including weevils and flies, have been employed as biocontrol agents for Yellow Star Thistle with minor success. Control of Yellow Star Thistle cannot be accomplished with a single treatment or in a single year. Effect management requires control of the current population with herbicides such as Glyphosate and suppression of seed production, combined with establishment of competitive, desirable vegetation.

Suisun Thistle

Cirsium hydrophilum
var. hydrophilum



Native



3.3-7.2'



July-September



3.9-16" l

ENDANGERED
SPECIES

Description

Suisun Thistle is a biennial or short-lived perennial herb with a branching, cobwebby stem. The leaves are longest near the base of the plant. The inflorescence bears one or more flower heads each up to about 1 inch long. The head is spiked with pink or purple flowers. Spikes on leaves 1-9mm.

Habitat

Suisun Thistle is a rare variation of *Cirsium hydrophilum*, a thistle endemic to the San Francisco Bay Area and the Sacramento-San Joaquin River Delta. It only occurs in tidal wetlands of Suisun Marsh.

Management

Suisun Thistle is known from just a handful of occurrences in Suisun Marsh tidal wetlands. This species variation is only found in brackish and salt marsh habitats. It is federally listed as an endangered species.




Stinkwort

Dittrichia graveolens

Other names:
stinking fleabane



 *nonnative, invasive*

 0.7-4.3'  September-November  0.04-1.6" w, 0.4-2.0" l

Description

Stinkwort is an erect, fall-flowering annual. Its foliage has sticky glandular hairs covered in resin. The resin emits a strong aromatic odor that resembles the smell of tarweeds. The flowerheads are 0.2-0.3 inches in diameter and consist of short yellow ray flowers on the outer edge and yellow to reddish disk flowers in the center. From a distance, stinkwort can resemble Russian-thistle.

Habitat

Stinkwort is native to the Mediterranean region of Europe. In California, this weed is most often found in disturbed places, such as overgrazed rangelands, roadsides, pastures, and levees. Stinkwort grows best on well-drained, sandy or gravelly soils and thrives in areas with hot, dry summers but can also do well along the margins of wetlands.

Management

This plant tolerates a variety of soils types and survives under a range of soil conditions, temperatures, and precipitation regimes. Stinkwort has very high seed viability, with an average of about 90% of the seeds capable of germination at the time they disperse from the plant. It can form dense infestations along highways and in open disturbed areas. The challenge in controlling stinkwort is applying the appropriate management at the proper time. Mechanical and chemical techniques can be effective, but determining the most appropriate timing is difficult.

Whitetop

Lepidium draba

Other names: hoary cress,
annual pepperweed



 *nonnative, invasive*



0.3-2.0'



March-August



0.4-1.6" w, 1.2-3.9" l

Description

The stem of whitetop is covered with fine hairs. These plants have leafy stems that are branched near the top and bear numerous tiny white flowers. The leaves are 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.

Habitat

Whitetop is native to southwestern Asia and has been introduced to every continent except Antarctica. Whitetop is commonly found on saline soils in fields and along ditch banks at elevations less than 2000 feet.

Management

This plant is a noxious weed that should be controlled in the same fashion as *Lepidium latifolium* (see Perennial Pepperweed).



Wild Mustard

Brassica nigra

Other names: black
mustard



1 mm



nonnative, invasive



16-40"



Jan-April



0.5-2.8" w, 2.0-10" l



Description

Wild Mustard is an annual non-woody plant 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 characteristic 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.

Habitat

Wild Mustard is native to Eurasia but has spread all over the world. In Suisun Marsh, it is commonly found in disturbed areas of high ground such as levee tops and along roadsides. Wild Mustard is often found alongside wild radish.

Management

This genus of plant species is important to breeding waterfowl and other species of ground nesting wildlife as cover.

Wild Radish

Raphanus sativus

Other names: jointed charlock



5 mm



! nonnative, invasive



1.3-4.3'



February-July



0.4-7.9" w, 0.8-24" l



Description

Wild Radish is an annual plant with a stem that is rough to the touch. The leaves are dark green with a velvet and fuzzy texture. 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.

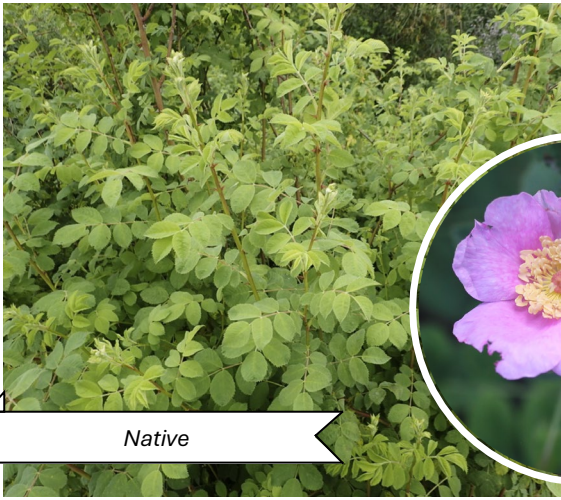
Habitat

Plants in this genus, *Raphanus*, are native to Asia, but they can now be found globally. In Suisun Marsh, Wild Radish is commonly found in disturbed areas in uplands, along roadsides, and on the tops of levees.

Management

Radish is an important plant to breeding waterfowl and other species of ground nesting wildlife which use the plant as cover. It is most beneficial in the early spring before high temperatures wilt the stems and reduce nesting cover. Its value decreases with disturbance and if it is knocked down.





Wild Rose

Rosa californica

Other names: California rose



3 mm



2.6-8.2'



May-August



0.4-1.0" w, 0.6-1.6" l

Description

The stem of this shrub is gray to brown with thorns that are compressed from side-to-side and strongly curved. The Wild Rose often forms 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 whiteish pink flower.

Habitat

Wild Rose generally forms dense thickets on elevated areas such as levees and roadsides predominantly in moist areas.

Management

This plant provides cover and food for wildlife, including passerines. It is excellent at stabilizing slough banks. If it becomes invasive, especially on levees, it can be mowed or sprayed with Garlon (triclopyr). Wild Rose provides food and cover for wildlife.

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