Guide to Native and Invasive Plants ^{of the} Storke Ranch Vernal Pool Open Space



Managing Vernal Pools in the Greater Santa Barbara Area

K Kelly Hildner, Ph.D.

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Cliff swallows collecting mud from a restored Storke Ranch vernal pool.

Photos, text, and layout K Kelly Hildner 2009

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Table of Contents

ABOUT T	HE AUTHOR	vi
IN THIS G	UIDE	1
Cal-IPC s	statewide impact rating	1
Plant Des	scriptions.	1
1 101110 2 00	••••P ••••••	
INTRODU	JCTION	2
Vernal Po	ools	2
Invasive	Species	3
General v	veeding guidance/timing	3
Solari	ization	4
Hand	weeding	5
Herbi	cides	7
Revegeta	tion	8
Monitorin	ng and Maintenance	8
THE NAT	IVES	9
Monocots	S	
Barley	y, California	10
Barley	y, Meadow	11
Blue-	Eyed Grass	12
Bulru	sh, California	13
Bulru	sh, Prairie	14
Lemn	non's Canarygrass	15
Pacifi	c Foxtail	16
Purple	e Needlegrass	17
Rush,	Brown-Headed	18
Rush,	Western	19
Saltgr	rass	20
Spike	rush, Common	21
Spike	rush, Needle	22
Tall F	latsedge	23
Dicots		
Califo	ornia Water Starwort	24
Coast	Allocarya (Coast Popcorn Flower)	25
Coyot	te-Thistle	26
Coyot	te-Thistle, Prickly	27
Gump	olant	28
Red N	Aaids	29
Short	Seed Waterwort	30
Slend	er Aster	31
Smoo	th Spike-Primrose (Pygmy Epilobium)	32



Southern Tarplant	33		
Water Pygmyweed	34		
Woolly Marbles	35		
THE INVASIVES			
Monocots			
Barley, Mediterranean & Foxtail	37		
Bermuda Grass	38		
Harding Grass	39		
Italian Rye Grass	40		
Pampas Grass & Jubata Grass	41		
Rabbitfoot Grass	42		
Ripgut Brome	43		
Smilograss	44		
Wild Oats	45		
Dicots			
Australian Saltbush	46		
Bindweed	47		
Brass Buttons	48		
Bristly Ox Tongue	49		
Bur-Clover	50		
Curly Dock	51		
Cut-Leaved Geranium	52		
English Plantain	53		
Fennel	54		
Filaree; Broad Leaf, Redstem, and Whitestem	55		
Hyssop Loosestrife	56		
Mustard; Black, Field, & Mediterranean Hoary	57		
Prickly Lettuce	58		
Scarlet Pimpernel (Poor-man's Weatherglass)	59		
Sheep Sorrel	60		
Sowthistle; Perennial, Prickly, & Annual	61		
Vetch	62		
Wild Radish	63		
PLANT TABLE	64		
RESOURCES	70		
Plants	70		
Granting Agencies	70		
Permits	71		
CLOSSARV	72		
DEFEDENCES	71		
	/4		
INDEX: PLANIS BY NAME76			

About the Author

K Kelly Hildner earned a B.A. in ecology from UC San Diego and a Ph.D. in conservation biology from UC Santa Cruz. Her dissertation research focused on the importance of genetic variability to physiological fitness in natural populations of pocket gophers. She has taught courses in and consulted on projects involving Geographical Information Systems (GIS) and their environmental applications, and she spent several years as a research associate at NOAA Fisheries studying the economic costs of salmonid habitat restoration.



In 2003, Hildner and her husband purchased a home in the Storke Ranch housing complex. There she became interested in the protected vernal pool habitat in the center of the development, which she noticed was being overrun by weeds. She consulted the literature and experts in the area to find out more about vernal pools and their associated plants. In 2004, she began organizing community work parties in an effort to control invasive species in the Storke Ranch open space. Starting in 2005, with the help of local vernal pool expert, David Hubbard, Hildner began planning community based projects to restore and enhance vernal pools and surrounding upland habitats at Storke Ranch. She has since planned and managed several small projects including the creation/restoration of two vernal pools. This guide was created to educate the Storke Ranch Homeowner's Association and other land managers and restoration practitioners about the maintenance of vernal pools and their surrounding grassland habitats.

In this Guide

Information in this guide is provided to help protect vernal pools and their surrounding grassland habitats. The "Introduction" section provides a brief introduction to vernal pools followed by general information about invasive plants and some general techniques for how to remove them. This section includes brief comments about revegetation and monitoring.

The introduction is followed by two sections containing descriptions of specific plants. "The Natives" section contains descriptions and photos of some of the native plants found in and around vernal pools at Storke Ranch. This section includes a notation as to whether the species is locally rare. Locally rare species are those that are listed as species of local concern in Santa Barbara County by the Central Coast Center for Plant Conservation (Wilken, 2007). "The Invasives" section contains descriptions and photos of some of the common weeds found in and around vernal pools. This section includes the California Invasive Plant Council (Cal-IPC) statewide impact rating, if applicable (see below), and removal tips for each species. The plants in each section are organized by major grouping (monocot vs. dicot), and within each grouping they are arranged alphabetically by common name. An index is provided (page 76).



Fennel has been categorized as an invasive species with high ecological impact by Cal-IPC

Cal-IPC statewide impact rating

The California Invasive Plant Council statewide impact rating for each invasive species is provided in this guide. The Cal-IPC Invasive Plant Inventory categorizes non-native invasive plants that threaten the state's wildlands. The inventory categorizes plants as High, Moderate, or Limited, reflecting the level of each species' negative ecological impact in California. In this categorization, even Limited species are invasive and should be of concern to land managers. The ratings represent the cumulative statewide impacts of each species. Therefore, a plant whose statewide impacts are categorized as Limited may have more severe impacts in a particular region.

For more information on the rating system, visit the Cal-IPC website at <u>www.Cal-ipc.org</u>. Ratings can change over time as plants are re-evaluated. For the latest information, visit the Cal-IPC website.

Plant Descriptions

Plant descriptions in this guide are general and intended for a lay audience. An expert should be consulted when there is any doubt in the plant identification. In some cases, notations are provided where native and non-native plants at Storke Ranch could be confused, and some diagnostic characteristics are provided where this was feasible without getting too technical. A glossary of terms is provided (page 72).

Introduction

Vernal Pools

Vernal pools are seasonally flooded landscape depressions underlain by impermeable soils. What makes these areas special is their unusual hydrology, which involves flooding during portions of the fall and winter followed by desiccation in the summer. Only plants and animals adapted to this drastic wet-dry cycle can survive over time in these habitats. For this reason, vernal pools typically support an abundance of rare, threatened, or endangered species.

Unfortunately, vernal pools are extremely vulnerable to destruction because they typically occur on flat, easily developed, easily accessible land. In fact, according to some estimates, over 90% of the vernal pool habitat in California has already been destroyed (Keeler-Wolf et al. 1998). Consequently, vernal pools are thought to be among the most threatened wetland ecosystems in the state (Stone 1990; Keeler-Wolf et al. 1998). At least 90% of the vernal pools in the Santa Barbara area have been destroyed (Ferren et al. 1998).

According to the California Department of Fish and Game, the majority of the remaining pools in the Santa Barbara region appear to be in some jeopardy, with the most imperiled being in the coastal zone. Negative impacts affecting vernal pools in this region include long-term intensive grazing, road construction, off-highway vehicle use, housing development, military operations, invasion of non-native plant species, and feral pig damage (Keeler-Wolf et. al 1998).

This guide is intended for private and public landowners and agencies that manage lands containing vernal pools. The guide was created based on the plants present in the Storke Ranch vernal pool open space in Goleta, California, but the information is also applicable to other vernal pools in the region. The vernal pools at Storke Ranch are in an open space area in the center of the Storke Ranch housing development. Two of the pools were restored beginning in the fall of 2006 and now support many species of local concern in Santa Barbara.



The restored south vernal pool at Storke Ranch in 3 seasons: winter, spring, and summer.

Invasive Species

Invasive species are introduced species that out-compete native species for space and resources. Invasives crowd out native plants and in some cases alter conditions in their immediate vicinity, making the habitat less suitable or wholly unsuitable for native plants and habitat dependent wildlife. Many invasives establish themselves and thrive under disturbed conditions. In this guide the terms invasive species, invasives, and weeds will be used interchangeably.



General weeding guidance/timing

In general, because of their harsh hydrologic regime, vernal pools are largely resistant to weed invasion. The intensity of invasion pressure increases from the deepest part of the vernal pool to the shallowest part, with upland areas lacking the resistance to invasion that is provided within the flooded basin. Repeated dry years, during which the duration of flooding is limited, will result in increased invasion pressure within vernal pools.

Vernal pools should be checked at least annually for invasive species. As vernal pools dry in the spring, plants flower in concentric rings around the pool. The best time for weed control is in the spring as the pools begin to dry. Weed around the pool while there is still some moisture left in the soil but before the plants set seed. As the pool dries, check around the edges of the pool for weeds such as rabbitfoot grass, burclover, Italian rye grass, hyssop loosestrife, curly dock, English plantain, ripgut brome, common brassbuttons, cut-leaved geranium, filaree, and vetch. If soil moisture levels are still high, these weeds can generally be removed by hand pulling or with the help of a small trowel.

Care should be taken to prevent damage to vernal pools during weeding activities. In general, select the weed control method that creates the least disturbance. Limit the trampling of native plants, and avoid compacting the soil as much as possible during weed control activities.

One of the best methods of controlling weeds is to prevent them from being introduced and spread in the first place. To prevent introduction and spread of weeds, limit disturbance, control weeds in surrounding areas, and educate neighbors and the public about weeds and how they are spread. Remove seeds from clothing and equipment before entering vernal pool areas.

Some general weeding techniques are outlined below. The Invasives section of this guide provides more detailed information about some of the common weeds in and around vernal pools along with common control methods. Refer to that section for specifics on individual plants.

Solarization

In the context of this guide, solarization refers to the killing of weeds using black plastic. Solarization kills weeds by heating and essentially cooking the plants while also depriving them of the sunlight needed for photosynthesis.

Effectiveness/selectivity

Solarization is most effective on annual plants and is most effective during the seedling stage. Generally speaking, solarization is a non-discriminating weeding technique and will kill most plants under the plastic. Hence, solarization should typically be used when native plants are not present or a clean slate is desired. Solarization for relatively short periods of time (3-6 weeks, depending on weather conditions), however, will generally only kill annual plants and not perennials. Therefore, solarization can be an effective technique for selectively killing invasive annual grasses and forbs surrounding perennial native plants such as common spikerush (Eleocharis macrostachya).



Technique and timing

Black plastic for solarization can be purchased at hardware stores or irrigation supply stores and typically comes in rolls of various sizes including 100ft x 20ft, 50ft x 20 ft, and 100ft x 10ft. Also needed for solarization are soil staples and sandbags. Six inch long metal soil staples that are 1.25 inches wide and sandbags that are $\frac{1}{2}$ to ³/₄ full of sand can be used to secure the plastic to the ground. Solarization is most effective on seedlings and is best performed when new weed seedlings have sprouted after the first rains of the season. Approximately 4 weeks after the first soaking rains of the season, once the weeds have sprouted, remove material that will prevent the plastic from lying flat on the ground, place the black plastic over the area to be weeded, and staple the plastic to the ground. For best results, fold the edge of the plastic under so the soil staples will hold two layers of plastic, and staple approximately every 4 feet. If the ground is hard, use a mallet to hammer the staples all the way into the ground so the plastic is firmly attached to the surface. Use sandbags to weight the plastic down so that it will stay down during heavy wind events. For a 2,000 sq ft sheet of plastic, generally at least 20 sandbags are needed. Place them at the corners, along the edges and down the middle of the sheet.



The amount of time needed to effectively kill weeds with solarization depends on the weather conditions and the resiliency of the weeds. Hot, sunny weather will result in faster, more effective solarization. Young, tender weeds will generally be killed within 3-4 weeks under these weather conditions. If the weather is cooler and cloudier, a complete kill may take 6 to 8 weeks or longer. Simply remove sandbags and staples from a corner of the plastic and look underneath to see if the weeds have died. When the weeds are completely brown (no green or bright yellow remaining), solarization is complete.

For the best weed control, ideally several rounds of solarization should be performed in order to remove as much of the weed seed bank as possible. After killing the weeds, uncover the area (ideally use the plastic on an adjacent area in need of weeding) and allow a new batch of weed seedlings to sprout (typically approximately 4 weeks after a soaking rain event). Then repeat the solarization. If possible, continue this process for several cycles before planting native plants.

Tip: If you would like to perform solarization for weed control but the weather is not providing you with timely rains to sprout the weeds, consider using irrigation to induce the weeds to sprout.

Note: Black plastic vs. clear plastic. Some practitioners recommend the use of clear plastic for solarization. In this geographic area, it appears that black plastic is much more effective than clear plastic. In some trials in Ojai, California, weeds continued to thrive under clear plastic but were killed under black plastic (D. Hubbard, pers. com.). Tests conducted by the Cheadle Center for Biodiversity and Ecological Restoration in Santa Barbara also found better weed control under black plastic, even though temperatures were higher under clear plastic, because black plastic prevents photosynthesis (Lisa Stratton, pers. com.).



Hand weeding

Hand weeding is the removal of invasive plants by manual means such as hand-pulling or using a tool such as a shovel, mattock, hoe, or Weed Wrench.

Effectiveness/selectivity

Hand weeding is recommended for areas where invasives need to be removed from amongst native plants. The selectivity of hand weeding varies depending on the method/tool used and the amount of caution used by the practitioner. To be most effective, hand weeding should remove weeds before they set seed and remove the entire weed including all root material.

Hand weeding is generally easier and more effective with plants that have shallow, fibrous root systems. Hand weeding of plants that have large taproots, bulbs, or rhizomes can be quite difficult, as removing all root material in these cases may not be possible without extensive soil disturbance. Because invasive species tend to thrive on disturbed soils, soil disturbance should be minimized as much as possible.

Interns hand weeding a vernal pool edge.



Community volunteers hand weeding curly dock from a Storke Ranch vernal pool.

Technique and timing

The most effective technique for hand weeding depends on many factors including the type of weed to be removed, the texture and moisture level of the soil, and the proximity of native species.

In general, the method that removes the root system with the least amount of soil disturbance should be employed, as soil disturbance can trigger soil seed banks and favor invasive species expansion. Pulling generally works well for annual and immature plants and can be done either by hand or with the help of a tool such as a trowel or shovel. A Weed Wrench (www.weedwrench.com) can be used for larger plants with strong, woody stems. Under certain soil moisture and texture conditions, Weed Wrenches are effective at removing curly dock (*Rumex crispus*), a common vernal pool weed, once the seed stalks have formed. Trial and error is necessary to determine whether the conditions are favorable.

If it is not possible to pull out the plant with its root system, cutting the plant before it sets seed may provide an effective means of controlling its spread. Above ground plant parts can be cut with a variety of different tools including pruners, shovels, mattocks, and weed whips. Cutting of some plants may encourage numerous resprouts that can quickly flower and set seed. Research the plant before cutting and/or follow up repeatedly to ensure effective control.

Timing of weed control depends on the timing of seed set for the various species. This timing depends a great deal on annual weather conditions. Weeds that are flowering should be removed before they can set seed. Properly dispose of the plant material to ensure that the weeds don't spread. Some plants, such as Bermuda grass, can re-root themselves if plant material is left in contact with the soil.

7

Herbicides

Herbicides are chemicals designed to kill plants. The local agricultural commissioner's office must be contacted to obtain an Operator ID number before purchasing or applying herbicides for any use other than residential. Herbicides can be effective at killing weeds with a minimal amount of labor; however, extreme care must be taken in applying herbicides in natural areas, as the chemicals could seriously harm adjacent native plants or contaminate soil or water sources.

Effectiveness/selectivity

The effectiveness and selectivity of herbicides depends on the type of herbicide used, the application method, and the target plant. Only herbicides that are approved for aquatic use should be used in and around vernal pools. Many herbicides are restricted from use in aquatic habitats because of potential danger to fish and amphibians. At Storke Ranch, the Coastal Development Permit for the East Vernal Pool Restoration Project stipulates that herbicides shall not be used within the vernal pools or within the 10-20 foot buffer around the pools. Before using herbicides in any vernal pool area, check to see whether any such restrictions are in place. Herbicides should be applied by a licensed qualified applicator. The California Department of Pesticide Regulation (DPR) is responsible for examining and licensing qualified applicators and for certifying pesticide applicators that use or supervise the use of restricted pesticides (including herbicides). For more information, visit www.cdpr.ca.gov/docs/license/currlic.htm. All pesticide applicators must wear appropriate personal protective equipment.

Technique and timing

The herbicide application technique used at Storke Ranch has involved foliar spray with a backpack sprayer using low pressure to avoid spray drift that could damage neighboring plants. This method should only be used when there is no wind. The primary target species for herbicide application at Storke Ranch has been Bermuda grass (*Cynodon dactylon*). The most effective times for herbicide application for this species are the fall and spring.

Contact the local Agricultural Commissioner's office or a licensed pest control advisor for information on current best management practices for herbicide application.



Planting nursery stock around a vernal pool at Storke Ranch.

Monitoring and Maintenance

habitat restoration and revegetation.

is important to use locally collected seed for

Regardless of the technique used for weed control, monitoring and maintenance are always necessary to ensure effectiveness. Check the habitat regularly to see how effective the weed control treatment was, to determine whether follow up weeding is required, and to determine whether the treatment had any unintended consequences.

Remnant natural habitats, such as the ones at Storke Ranch, face continuing threats and need to be actively monitored and maintained to prevent habitat degradation. At Storke Ranch, the vernal pool habitats have been protected in perpetuity by an open space easement with the City of Goleta. Nonetheless, the habitat faces ongoing threat from weed invasion. Care should be taken to prevent the dispersal of weed seeds into the vernal pools and among protected areas. The habitat should be checked at least quarterly for weed invasions by a qualified biologist, and control activities should be scheduled as needed. More frequent monitoring and maintenance will result in more effective control if weeds can be prevented from setting any seed. This will translate into reduced maintenance costs over the long term.



Native plants in a Storke Ranch vernal pool

Common Name

Scientific Name: Rare in Santa Barbara County?

The Natives

Following are profiles for some of the primary species found in and around the Storke Ranch vernal pools. Each profile includes basic identification information including the common name, scientific name, and family of the plant along with whether the plant is rare in Santa Barbara County according to the Central Coast Center for Plant Conservation (Wilken, 2007). There are one or more photos for each species, followed by a verbal description of the plant and its habitat.

The plants are organized by major grouping (monocot vs. dicot), and within each grouping they are arranged alphabetically by common name. Monocots and dicots are separated by the number of cotyledons (seed leaves) in the embryo; monocots have one and dicots have two. Monocots include grasses, rushes, and sedges. These plants have parallel major leaf veins and flower parts in multiples of three. Dicots in contrast have net-like leaf veins and flower parts in multiples of four or five.

The basic format of each native plant profile is as follows:

Photo(s)

Description:

Habitat:

Family

Barley, California

Scientific Name: Hordeum branchyantherum ssp. californicum Rare in Santa Barbara County? No Poaceae



Description: California barley is a tufted perennial bunchgrass with slender stems. California barley is shorter and more spreading than meadow barley (*H. brachyantherum* ssp. *brachyantherum*). The central spikelet glumes are generally spreading with age, and the lemma awn is up to 0.3 inches (7.5 mm).

Habitat: Meadows, pastures, streambanks; <1,600 feet (500 m).

Barley, Meadow

Scientific Name: Hordeum brachyantherum ssp. branchyantherum Rare in Santa Barbara County? No Poaceae



Description: Meadow barley is a tufted perennial bunchgrass with generally robust stems. The flowerhead (panicle) is a narrow, flattened spike, 2 to 4 inches (5 to 10 cm) long that breaks off in pieces from the top down at maturity. Leaves are green to bluish green, 0.08 to 0.4 inches (2 to 9 mm) wide. They may be primarily basal or extend up and down the stem. Meadow barley is upright, while its closest relative, California barley (*H. brachyantherum* ssp. *californicum*), is shorter and more spreading. The central spikelet glumes are generally straight with age, and the lemma awn is up to 0.2 inches (4.5 mm).

Habitat: Meadows, pastures, streambanks; <11,000 feet (3,400 m).

Blue-Eyed Grass

Scientific Name: Sisyrinchium bellum Rare in Santa Barbara County? No Iridaceae



Description: Blue-eyed grass is a perennial herb in the iris family that grows up to 2 feet (64 cm) tall. Flowers are deep bluish purple to blue-violet and 0.4 to 0.7 inches (10.5 -17 mm) in diameter. Flowers: March to May. Plants are dormant in the summer.

Habitat: Common; found in open, generally moist, grassy areas and woodlands; < 7,900 feet (2,400 m).

Bulrush, California

Scientific Name: Schoenoplectus californicus Scirpus californicus (previous name) Rare in Santa Barbara County? No

Description: California bulrush is a rhizomatous perennial sedge 6.6 to 13 feet (200-400 cm) tall. It has tall thin (<0.4 inches (10 mm) wide), dark green stems that are usually triangular in cross-section. Leaves are generally basal. Inflorescences are orange-brown and panicle-like with 20 to many spikelets, clustered at branch tips.

Habitat: Marshes; <660 feet (200 m).



Cyperaceae

Bulrush, Prairie

Scientific Name: Bolboschoenus maritimus Scirpus maritimus (previous name) Rare in Santa Barbara County? No Cyperaceae



Description: Prairie bulrush is a rhizomatous perennial sedge 2.6 to 5 feet (80-150 cm) tall. It has leafy, erect, sharply 3-angled stems roughly 0.1 to 0.3 inches (3-8 mm) wide. Leaves are generally borne along the stem. The inflorescence has 4-many spikelets, 0.4 to 1.2 inches (10-30 mm), usually 0.28 to 0.3 (sometimes 0.2) inches (7-8 (sometimes 5) mm) wide, often in one dense cluster at branch tips with 2-3 leaf-like bracts that extend far beyond the inflorescence.

Habitat: Marshes; <8,200 feet (2,500 m).

Lemmon's Canarygrass

Scientific Name: *Phalaris lemmonii* Rare in Santa Barbara County? Yes

Poaceae

Description: Lemmon's canarygrass is an annual grass 8-30 inches tall. The 1.6 to 4.7 inch (4-12 cm) inflorescences are interrupted at the base. Spikelet glumes are 0.2 to 0.3 inches (5-7 mm), with veins with short, stiff hairs; the upper lemma is 0.16 to 0.3 inches (4-5 mm), lanceolate-ovoid, swollen, with spreading hairs and a smooth tip.

Habitat: Generally moist areas, shrubland, woodland; <2,500 feet (750 m).



Pacific Foxtail

Scientific Name: Alopecurus saccatus (A. howellii) Rare in Santa Barbara County? Yes Poaceae



Description: Pacific foxtail is a tufted annual grass 4-16 inches tall. The upper sheaths are inflated, and the anthers are orange.

Habitat: Vernal pools and moist, open meadows below 2,300 feet (700 m) elevation.

Purple Needlegrass

Scientific Name: Nassella pulchra Rare in Santa Barbara County? No

Poaceae



Description: Purple needlegrass is a tufted perennial bunchgrass. Stems are 12-39 inches (3-10 dm). Leaves are tough with blades 0.03 to 0.14 inches (0.8-3.5 mm) wide. The inflorescence is an open panicle 7 to 24 inches (18-60 cm). Spikelet glumes are not quite equal length, 0.47 to 0.75 inches (12-19 mm); the lemma is evenly hairy, becoming smooth on the veins. Awns are 1.5 to 4 inches (38-100 mm), strongly bent twice, with the distal segment straight.

Habitat: Oak woodland, chaparral, grassland; <4,300 feet (1,300 m).

Rush, Brown-Headed

Scientific Name: Juncus phaeocephalus Rare in Santa Barbara County? No Juncaceae



Description: Brown-headed rush is a rhizomatous, perennial rush growing 10-30 inches tall. The stems and leaves are flat. The inflorescence has 1 to many dark brown flower clusters. Each flower has 6 stamens and long stigmas that stick out of the flowers.

Habitat: Moist places, <7,200 feet (2,200 m).

18

Rush, Western

Scientific Name: Juncus occidentalis Rare in Santa Barbara County? No Juncaceae



Description: Western rush is a clump forming perennial rush, 6-24 inches tall. It has many, narrow 0.04 to 0.06 inch (1-1.5 mm) wide, flat, basal leaves. The inflorescence is generally open, has 5-50 flowers, and is 0.4 to 2.8 inches (1-7 cm). Flowers: spring to early summer.

Habitat: Moist areas <7,500 feet (2,300 m).



Saltgrass

Scientific Name: Distichlis spicata var. spicata Rare in Santa Barbara County? No Poaceae



Description: Saltgrass is a native rhizomatous perennial grass 4 to 16 inches high that, aside from the inflorescence, looks superficially similar to Bermuda grass (*Cynodon dactylon*), an invasive species. Saltgrass often forms dense colonies. Saltgrass can survive in saline soils and secretes visible salt crystals on leaf blades and stems.

Habitat: Salt marshes; moist, alkaline areas; < 3,280 feet (1,000 m).

Spikerush, Common

Scientific Name: *Eleocharis macrostachya* Rare in Santa Barbara County? No Cyperaceae



Description: Common spikerush is a perennial herb, 4-28 inches (5-10 dm) tall that spreads by rhizomes. Stems are round and leaves are loosely sheathing with a purplish base, becoming straw-colored above. Inflorescence is a 0.2 to 1 inch (5-25 mm) spikelet of 10-many flowers, not much wider than the stem. Style is 2-branched. Fruit is yellowish brown and 0.06 to 0.1 inches (1.5-2.5 mm), obovate, and strongly 2-sided.

Habitat: Marshes, ponds, vernal pools, and ditches; <8,200 feet (2,500 m).



Spikerush, Needle

Scientific Name: *Eleocharis acicularis* Rare in Santa Barbara County? No Cyperaceae



Description: Needle spikerush is a grass-like, rhizomatous, perennial herb 0.8 to 6 inches (2-15 cm) tall. Leaves are needle-like with pale reddish basal sheaths. The inflorescence is a more or less linear spikelet 0.1 to 0.3 inches (3-7 mm). Style is 3-branched. Fruit is dull yellow to white and 0.03 to 0.04 inches (0.7-1 mm), weakly 3-sided and elliptic to obovate.

Habitat: Marshes, meadows, riverbanks, vernal pools, in sagebrush scrub to lodgepole-pine forest; <8,200 feet (2,500 m).

Tall Flatsedge

Scientific Name: Cyperus eragrostis Rare in Santa Barbara County? No Cyperaceae



Description: Tall flatsedge is a perennial to 3 ft tall with 3-angled or round stems. Leaves are flat or v-shaped. Inflorescences have 4-8 bracts and are composed of 20-70 flat, oblong spikelets in spheric heads. Note: there is an invasive horticultural sedge (umbrella sedge) that could be confused with this species; the invasive has many bracts per inflorescence.

Habitat: Moist places, vernal pools, stream banks, and ditches, 0 to 3,000 feet (0 to 700 m).

California Water Starwort

24

Scientific Name: *Callitriche marginata* **Rare in Santa Barbara County?** Yes

Callitrichaceae



Description: Water starwort is a delicate, mat-like plant with tangled stems that grow up to 3 inches long. It is found in water or mud. In vernal pools, leaves often float on the surface, attached to threadlike stems.

Habitat: Often in vernal pools, submersed or stranded; < 5,000 feet (1,500 m). Found in vernal flats in coastal areas in Isla Vista and Ellwood Mesa.

Coast Allocarya (Coast Popcorn Flower)

Scientific Name: *Plagiobothrys undulatus* Rare in Santa Barbara County? Yes Boraginaceae



Description: Coast allocarya is a spreading to erect, sparsely short-strigose (with stiff, straight, sharp hairs parallel to the surface) annual herb. Stems are 3-14 inches long. Leaves are borne on the stems. Inflorescence pedicels are inconspicuous, generally 0 to 0.04 inches (0-1 mm). the ring of sepals (calyx) is more or less 0.08 inches (2 mm) and the ring of petals (corolla) is 0.06 to 0.08 inches (1.5-2 mm) wide. Definitive species identification requires microscopic seed inspection.

Habitat: Vernal pools, wet places; <1,300 feet (400 m).

Coyote-Thistle

Scientific Name: *Eryngium vaseyi* Rare in Santa Barbara County? Yes Apiaceae



Description: Coyote-thistle is a spreading perennial herb, branching horizontally from the main stem. Leaf blades are 3 to 9 inches (8-24 cm), lanceolate to oblong and deeply pinnately, sharply lobed. Aquatic stage of foliage is tubular. Inflorescence head 0.3 to 0.5 inches (8-13 mm) with 7-8 bracts twice as long as heads with teeth near the base.

Habitat: Vernal pools, (alkaline) depressions; 30 to 2,000 feet (10-600 m).

Native Species

Coyote-Thistle, Prickly

Scientific Name: *Eryngium armatum* Rare in Santa Barbara County? Yes Apiaceae



Description: Prickly coyote-thistle is a spreading perennial herb 4 to 20 inches (1-5 dm). Leaves are thick, 4 to 12 inches (10-30 cm), oblanceolate, and sharply serrated to irregularly cut. Inflorescence is a spiky flower head surrounded by 7-8 long, sharp-pointed, usually entire bracts with white margins, sometimes with more layers of bractlets on top.

Habitat: Vernal pool margins, depressions in coastal prairie, bluffs; 0 to 656 feet (0-200 m).



Gumplant

Scientific Name: Grindelia camporum Rare in Santa Barbara County? No Asteraceae



Description: Gumplant is a perennial plant that grows to 2 feet tall or more and is found around the edges of vernal pools. The inflorescence is 0.7 to 1.0 inches (17-25 mm) in diameter and consists of 25-39 ray flowers with yellow ligules (petals), approximately 0.3-0.4 inches (8-11 mm) long and many disk flowers. There are bracts around the base of the inflorescence that are long and curved backward. Leaves arise directly from the stem and are sticky or shiny. Flowers: May to July.

Habitat: Sandy or saline low-lying areas near water, fields, roadsides; < 4,600 feet (1,400 m)
Red Maids

Scientific Name: Calandrinia ciliata Rare in Santa Barbara County? No

Portulacaceae



Description: Red maids is a fleshy, spreading annual herb with showy magenta flowers. Leaves are 0.4 to 4 inches (1-10 cm), linear to oblanceolate and flat. Flowers have 2 sepals and usually 5 petals. Flowers: mostly February to May.

Habitat: Common. Sandy to loamy soil, grassy areas, cultivated fields; <7,200 feet (2,200 m).

Short Seed Waterwort

Scientific Name: *Elatine brachysperma* **Rare in Santa Barbara County?** Yes Elatinaceae



Description: Short seed waterwort is a tiny annual plant with leaves that are ovate to narrowly oblong, and one flower per leaf node, resting directly on the stem (no pedicel). Flowers generally have 2-3 sepals and 3 petals. Definitive species identification requires microscopic seed inspection.

Habitat: Muddy shores and shallow pools; 160 to 1,600 feet (50-500 m).

Slender Aster

Scientific Name: Symphyotrichum subulatum var. ligulatum Rare in Santa Barbara County? Yes Asteraceae



Description: Slender aster is an annual that grows up to 40 inches tall. Leaves are smooth and linear to oblanceolate and grow both basally and along the stem. Inflorescence has many pink to violet ray flowers. Flowers: July to October.

Habitat: Wet places, often alkaline, <660 feet (200 m).



Smooth Spike-Primrose (Pygmy Epilobium)

Scientific Name: *Epilobium pygmaeum* **Rare in Santa Barbara County?** Yes

Onagraceae



Description: Smooth spike-primrose is an annual herb <22 inches (5.5 dm). Leaves arise almost directly from the stem and are opposite only near the base. Flowers are generally cleistogamous (self-fertilizing) with 0.04 to 0.1 inch (1-3 mm), pink petals.

Habitat: Vernal pools, clay and mud flats; <8,200 feet (2,500 m).

Native Species

Southern Tarplant

Scientific Name: Centromadia parryi ssp. australis (Hemizonia parryi ssp. australis) Rare in Santa Barbara County? Yes

Description: Southern tarplant is an annual herb that is included on the California Native Plant Society's list 1B.1, seriously endangered in California. The inflorescence consists of ray flowers with yellow-orange ligules (petals), approximately 0.08 inches (2 mm) long and disk flowers with brown or black anthers. Leaves are rigidly spine tipped in mature plants. Plants range in size from a couple of inches to over 2 feet.

Habitat: Seasonally moist grassland, < 650 feet (200 m).





Asteraceae

Water Pygmyweed

Scientific Name: Crassula aquatica Rare in Santa Barbara County? Yes Crassulaceae



Description: Water pygmyweed is a tiny, succulent, spreading, branched annual up to 2 inches tall. Leaves are 0.08 to 0.24 inches (2-6 mm), oblanceolate to linear with acute tips. There is one flower per leaf pair growing on a short stalk, from the base of the leaf pair. Flowers are only 0.04 to 0.08 inches (1-2 mm). Vegetation is greenish-yellow to bright red.

Habitat: Salt marshes, vernal pools, ponds, < 9,800 feet (3,000 m).

Woolly Marbles

Scientific Name: *Psilocarphus brevissimus* Rare in Santa Barbara County? Yes

Asteraceae



Description: Woolly-marbles is an annual herb that is variously tomentose (covered with densely interwoven, generally matted hairs), with several stems from the base, spreading to erect. Largest flower heads are generally 0.2 to 0.6 inches (6-14 mm) across. Uppermost leaves are generally lanceolate to ovate, the longest being 0.3 to 1 inch (8-25 mm), 1.5 to 4 times longer than wide.

Habitat: Vernal pools and flats; <8,200 feet (2,500 m).



The Invasives

Following are profiles for some of the more common and/or noxious invasive species found in and around the Storke Ranch vernal pools. Each profile includes basic identification information including the common name, scientific name, origin, and family of the plant along with the Cal-IPC statewide impact rating. There are one or more photos for each species, followed by a verbal description of the plant, a summary of its ecological damage, how it spreads, and some tips and suggestions for removal.

The plants are organized by major grouping (monocot vs. dicot) and within each grouping they are arranged alphabetically by common name. Monocots and dicots are described briefly in the intro to The Natives on page 9.

The basic format of each invasive plant profile is as follows:

Restoration intern with bristly ox tongue.

Common Name

Scientific Name: Origin: Cal-IPC statewide impact rating:

Photo(s)

Description:

Ecological Damage:

How it spreads:

Removal:

Family

Barley, Mediterranean and Foxtail

Scientific Name: *Hordeum marinum & H. murinum* Origin: Europe Cal-IPC statewide impact rating: Moderate



Mediterranean Barley

Foxtail Barley





Meadow Barley (native)

Description: Mediterranean barley and foxtail barley are annual grasses with dense, bristly flower heads with conspicuous awns. At maturity, flower spikes break apart into several pieces. Foxtail barley has well developed auricles (small ear-like projections found at the junction of the blade and the sheath in grasses), up to 0.3 inch (8 mm). In Mediterranean barley, auricles are usually absent but can be up to 0.1 inch (3 mm). Note: There are 2 perennial native barley grasses found at Storke Ranch: meadow barley (*Hordeum brachyantherum* subsp. *brachyantherum*) and California barley (*H. brachyantherum* subsp. *californicum*). These native barleys have generally longer, more slender inflorescences with shorter awns and also lack auricles on the leaves.

Ecological Damage: Mediterranean barley and foxtail

barley can out-compete native perennial grasses. The stiff, barbed awns of mature inflorescences can injure the mouth eyes, skin, and nasal passages of animals. Mediterranean barley can invade the edges of vernal pools and relatively undisturbed grassland.

How it spreads: Spikelets attach to equipment, clothing, and animal fur and feathers.

Removal: Remove by hand before seed set for small infestations. For large infestations, solarize with black plastic for multiple grow-kill cycles. Some control can be achieved by cutting close to the ground and removing the vegetation about 10 days after the seed heads start to turn color. This is most effective when repeated for multiple years. Selective use of glyphosate herbicide may also be effective.

Bermuda Grass

Scientific Name: Cynodon dactylon Origin: Africa Cal-IPC statewide impact rating: Moderate



Description: Bermuda grass is a creeping perennial grass with long, slender, creeping stems above and below ground. Leaves have a conspicuous ring of white hairs where the leaf blade meets the stem. Stems spread laterally over the soil surface, often rooting at lower nodes. Flowering stems are upright and have 4-7 spike-like branches in a radiating configuration resembling fingers on a hand. Vegetation looks similar to native saltgrass (*Distichlis spicata*), but flowers are very different.

Ecological Damage: Forms large, dense ground cover mats that can inhibit native plant survival. Under drought conditions it can be poisonous to herbivores. Bermuda grass also causes hayfever.

How it spreads: Spreads by seed and vegetatively

from above and below ground stems that root at nodes. Can be transported long distances by water, mowing equipment, vehicles, horses, and cattle. Ants can transport seeds short distances.

Removal: Bermuda grass is difficult to control. Repeated removal of above ground plant material can inhibit growth, and hand hoeing or other shallow cultivation will remove the upper portions of plants and is particularly effective in the summer when dessication of the rhizome fragments will occur. Solarization with black plastic for several months in the summer is an effective control method for large infestations. Glyphosate herbicide application in the spring or preferably fall can also be effective, but multiple applications may be necessary.

Harding Grass

Scientific Name: *Phalaris aquatica* Origin: Mediterranean Europe (CA cultivar introduced from Australia) Cal-IPC statewide impact rating: Moderate



Description: Harding grass is a perennial grass that forms large clumps with short rhizomes around the base. Stems can grow up to 5 ft (150 cm) tall. Inflorescence is 0.6 to 4.3 inches (1.5 to 11 cm) long, 0.4 to 1 inch (1 to 2.5 cm) wide, and is generally cylindric, sometimes interrupted in the lower 1/3. Leaf blades are 2 to 6 inches (5-15 cm) long and 0.02 to 0.4 inches (0.5-10 mm) wide. Note: The native Lemmon's Canarygrass (*Phalaris lemmonii*) is an annual grass that is found in vernal pools at Storke Ranch (see page 15).

Ecological Damage: Harding grass can out-compete and displace native species, forming localized dense

stands.

How it spreads: Reproduces by seed, which is produced between May and September. It can also spread by rhizomes.

Removal: Digging plants out can be effective, but is very labor intensive and can disperse roots that may resprout. Frequent removal of herbage during the active growth period reduces biomass and promotes mortality. Probably the best control method, according to The Nature Conservancy, is repeated mowing followed by glyphosate herbicide application on resprouts.

Italian Rye Grass

Scientific Name: Lolium multiflorum Origin: Europe Cal-IPC statewide impact rating: Moderate

Description: Italian rye grass is an upright 1 to 2.5 foot tall annual grass that is often purplish red at the base. Leaves are generally 0.1 to 0.3 inches (3-7 mm) wide and have a flat, shiny green blade with prominent veins. Flower spikes are 4 to 12 inches (10-30 cm) and have spikelets that are flattened edgewise and alternate along the flower stem

Ecological Damage: Can significantly impact native

grassland communities and vernal pools.

How it spreads: Italian rye grass is widely distributed in hay and is still sold as seed. It produces copious seed, most of which probably falls near the parent plant.

Removal: Remove by hand before seed set. Large infestations can be eradicated by repeated solarization.

Pampas Grass and Purple Pampas Grass

Scientific Name: Cortaderia selloana, Cortaderia jubata Origin: Central South America Cal-IPC statewide impact rating: High



Description: Large, perennial, clump-forming grass growing 6.5 to 23 feet (2-7 m) tall. The leaves are narrow and sharp (finely serrated), and the inflorescences are large and fluffy (white in *C. selloana* and purple tinged in *C. jubata*).

Ecological Damage: Increases both frequency and intensity of fire; displaces native species; decreases forage and nesting sites for native animals.

How it spreads: Often found in disturbed areas. Produces many seeds that are dispersed by the wind up to 20 miles. Sold in the nursery trade and also dispersed by people playing with plumes. May also spread vegetatively from fragments or root mass of a mature plant.

Removal: It is important to prevent seed spread. Carefully remove and dispose of all seed plumes. Remove in the spring before seed set. Dig out small plants. Cut larger plants to the ground and dig out the root mass. Solarization or herbicides can be used to prevent resprouts.

Rabbitfoot Grass

Scientific Name: *Polypogon monspeliensis* Origin: South and West Europe Cal-IPC statewide impact rating: Limited Poaceae



Description: Rabbitfoot grass is a shallow-rooted winter annual grass 1/2-3 feet (2-10 dm) tall with narrow blue-grey-green leaves that are often abruptly bent. The inflorescence is a soft, pale-green spike-like panicle that somewhat resembles a furry rabbit foot. Inhabiting moist to wet places, rabbitfoot grass is an aggressive weed in vernal pools, where even tiny (1 inch) plants can flower and set seed.

Ecological Damage: Highly invasive in vernal pools. This grass can take over large areas leaving less room for native annual vernal pool species; may be allelopathic.

How it spreads: Thrives in disturbed areas; spreads mainly by producing copious seed. Seeds can disperse with water or by clinging to animals. Sometimes spreads my stolons.

Removal: It is important to prevent this species from taking hold in vernal pools if possible. Remove plants by hand in late winter or early spring, before they set seed. Plants can flower even when very small.

Ripgut Brome

Scientific Name: Bromus diandrus Origin: Europe Cal-IPC statewide impact rating: Moderate



Description: Ripgut brome is an annual grass that occurs throughout California and can grow up to 30 inches tall. It has a tubular sheath on the seedling, distinguishing it from most other grass seedlings. Soft hairs cover the leaf blades and sheaths. The membranous ligule is long, whitish, and jagged. The inflorescence is an open panicle, similar to oats. Large spikelets have awns that are 1 to 2 inches (2.5 - 5 cm) long. The swollen nodes of the stems distinguish ripgut brome from the native purple needlegrass. Brome can become established over a wide range of soil moisture. Note: this genus also contains some native species.

Ecological Damage: High water use efficiency allows

late season growth; interferes with the establishment and survival of native plant seedlings; and produces abundant potential fuel, potentially increasing frequency and severity of fires. Floret parts have tiny, rough teeth that are injurious to livestock and pets.

How it spreads: Soil disturbance contributes to spread. A single plant can produce up to a thousand seeds. Seeds are wind dispersed and florets can stick to clothing and fur.

Removal: Pull by hand before seed set. For large infestations, mow or weed whip late March to early April before seeds mature. Solarization is also effective.



Smilo Grass

Scientific Name: *Piptatherum miliaceum* Origin: Mediterranean Cal-IPC statewide impact rating: Limited Poaceae



Description: Smilo grass is a tufted perennial grass that appears to be spreading in natural areas of Southern California. It grows 1-5 feet tall (4-15 dm). The inflorescence is 6 to 16 inches (15-40 cm) and has whorled branches with many tiny spikelets. Each spikelet has a single floret about 1/16 inch (1.5-2 mm). Awns are about 1/8 inch (3-4 mm) and drop readily. Flowers: April to September.

Ecological Damage: Smilo grass is larger than most native grasses and alters the structure of grassland areas by creating a raised canopy.

How it spreads: Smilo grass usually occurs in areas with human or natural disturbance. It reproduces by seed which can be carried by water, soil movement, and human activities. It resprouts from underground when cut.

Removal: Remove plants by digging out the root mass to prevent resprouting. Best removed before flowering in late winter or early spring when the soil is moist.

Wild Oat

Scientific Name: *Avena fatua* and *A. barbata* Origin: Europe and Central Asia Cal-IPC statewide impact rating: Moderate Poaceae



Description: Wild oat is an annual grass, 1-4 feet tall, with erect, hollow stems. Leaf blades are flat, 1/16 - 1/2 inch wide, with membranous ligules. Seedling leaves twist counter clockwise. Inflorescence is an open panicle, nodding, with 2-3 florets per spikelet. Blooms: March-June.

Ecological Damage: Out-competes native grasses; allelopathic; forms extensive fibrous root system.

How it spreads: Needs disturbance to establish; often associated with agricultural fields. Most seed falls near parent plant.

Removal: Pull plants by hand before seed set. For extensive areas without native species, solarize with black plastic.

Australian Saltbush

Scientific Name: *Atriplex semibaccata* Origin: Australia Cal-IPC statewide impact rating: Moderate Chenopodiaceae



Description: Australian saltbush is a droughttolerant spreading shrubby perennial less than 1 foot tall, spreading up to 6 feet or more across. It has silvery gray evergreen leaves and small red fruit. It is invasive in coastal grasslands and scrub and the higher ground of salt marshes. Note: this genus also contains some native species, some of which are found at Storke Ranch.

Ecological Damage: Displaces native plants. A single plant can form a mat up to 6 feet in diameter; creates a thick ground cover.

How it spreads: Spreads by seed. Fruits are dispersed by fruit eating mammals, birds, reptiles, and ants. Resprouts when cut. It establishes well in areas that have been heavily grazed or disturbed. This plant is sold horticulturally and has been promoted as a fireresistant ground cover and for reclamation of mined sites in the southwest.

Removal: Remove by pulling out the entire plant by hand before seed set. Seeds are produced from summer to December.

Bindweed

Scientific Name: *Convolvulus arvensis* Origin: Europe Cal-IPC statewide impact rating: Evaluated but not listed Convolvulaceae



Small bractlets

Description: Bindweed is a perennial herb or vine with a deep, persistent root. Leaves are more or less arrowhead shaped with tip generally rounded. Flowers are funnel shaped, white to pinkish; purplish outside, particularly at the folds. Flowers are approximately 1 inch in diameter with 2 small bractlets about 1 inch below the flower. Flowers: May to October. Note: size and position of small bractlets distinguish this species from the similar-flowered native island morning glory (*Calystegia macrostegia*) and Pacific false bindweed (*C. purpurata*). Note: there is also a native plant in the genus Convolvulus, small flowered morning glory (*C. equitans*), but it is not currently found at Storke Ranch.

Ecological Damage: Can draw down soil moisture

levels and disadvantage other species under dry to moderately moist conditions. Foliage contains tropane alkaloids which can cause intestinal problems in horses and presumably other animals.

How it spreads: Once established, can spread rapidly through regeneration from underground parts, and long-lived seeds can be spread by water, birds, and mechanical equipment. One plant can produce 500 seeds which can remain viable in the soil for 20 years or more. Reproduces vegetatively by perennial roots/ rhizomes and cut shoots.

Removal: Remove above ground biomass multiple times over at least 2 growing seasons. Treat with herbicide.

Brass Buttons

Scientific Name: *Cotula coronopifolia* Origin: Southern Africa Cal-IPC statewide impact rating: Limited Asteraceae



Description: Common brassbuttons is an invasive perennial herb that is usually less than 1.5 feet (0.5 meters) with stems generally lying flat on the ground but with ends that curve upward. Foliage is aromatic and flower heads are button-like. It typically occurs in wetlands and is a frequent invader of vernal pools.

Ecological Damage: Possible impacts to vernal pool

species.

How it spreads: Spreads by seed and vegetatively from stems that root at nodes. Can be transported by water.

Removal: Pull by hand before seed set; remove entire root.

Bristly Ox Tongue

Scientific Name: *Helminthotheca echioides* Origin: Europe Cal-IPC statewide impact rating: Limited Asteraceae



Description: Bristly ox tongue is a broad-leaved annual or biennial plant, 12 to 32 inches (3-8 dm), common throughout most of California and occasionally found in seasonally wet places. Leaves are oblong and covered with blister-like swellings with coarse, barbed, and bristly hairs. Yellow flower heads are carried at the top of stems. Petals are toothed.

Ecological Damage: Can form dense stands in coastal areas.

How it spreads: Inhabits disturbed places, such as roadsides, fields, and pastures. Seeds disperse by wind, water, and by clinging to tires and equipment.

Removal: Dig plants out by hand before flowering to prevent spread. Flower heads can ripen and set seed if left onsite, so material bearing flowers or buds should be removed from the site.



Bur-Clover

Scientific Name: *Medicago polymorpha* Origin: Mediterranean Cal-IPC statewide impact rating: Limited Fabaceae



Description: Bur-clover is an annul herb with prostrate, mat-forming or ascending stems, 4 to 16 inches (1-4 dm). Leaves are composed of 3 leaflets, each generally 0.4 to 0.8 inches (1-2 cm). Inflorescence consists of 2-6 yellow flowers. Fruit (bur) is coiled 2-6 turns and typically has prickles.

Ecological Damage: This plant fixes nitrogen, increasing nutrient levels in the soil. Increased nutrient levels generally favor weedy plant species that

can utilize the enhanced resources. Higher nutrient levels in the soil allow more biomass production and increased thatch.

How it spreads: Seed pods (burs) attach to clothing and animal fur. Seeds remain viable for years.

Removal: Remove by hand before seed set. Solarization and herbicides are also effective against this species.

Curly Dock

Scientific Name: *Rumex crispus* Origin: Eurasia Cal-IPC statewide impact rating: Limited Polygonaceae



Description: Curly dock is a robust perennial herb 2-5 feet (0.6-1.5 m) tall that usually grows in wet areas. The mostly basal leaves are elongate, 4-12 inches, with wavy margins. Stems are often reddish and slightly ridged. Flowers are small and in dense, green, spike-like clusters. Inflorescences turn reddishbrown at maturity. Curly dock has a thick, carrot-like taproot. Note: this genus also contains some native species.

Ecological Damage: Creates a new structural layer and pushes out native species once established.

How it spreads: Produces copious seed (40,000/plant) spread by humans and animals. Seed can survive for many years in the soil.

Removal: Remove by hand pulling, Weed Wrenching, or digging (remove crown at least 2 inches below the surface). Remove entire root if possible because remaining portions can resprout. Weed Wrenching and hand pulling are most effective in the spring when the stalk has begun to toughen but is not yet brittle. Repeated, frequent removal of all above-ground vegetation can weaken and eventually kill plants.

Cut-Leaved Geranium

Scientific Name: Geranium dissectum **Origin:** Europe Cal-IPC statewide impact rating: Moderate

Leaf divided into 5-7 segments Upper half of segments lobed

Description: Cut-leaved geranium is a low-growing annual herb that is commonly found throughout California in disturbed areas and grasslands. Leaf blades are 0.8 to 2.4 inches (2-6 cm) wide and are deeply dissected into 5-7 segments, with the upper half of the segements lobed. Flowers are rose to purple with sepals and petals more or less equal in length. Note: this genus also contains some native species, but they are not currently found at Storke Ranch.

Ecological Damage: Once established, cut-leaved

geranium appears to displace herbaceous native species.

How it spreads: Disturbance assists the spread of cutleaved geranium which produces copious seed. Fruits stick in animal fur, clothing, and on equipment. This species is also spread in contaminated hay or grain.

Removal: Remove by hand before seed set. Solarization can be used for large infestations lacking native species.



English Plantain

Scientific Name: *Plantago lanceolata* Origin: Europe Cal-IPC statewide impact rating: Limited



Description: English plantain is a perennial herb that thrives in disturbed areas. It has a basal rosette of lance-shaped leaves that have distinct parallel veins. The inflorescence is a $\frac{3}{4}$ - 3 inch (2-8 cm) spike at the end of a 7.5-30 inch (20-80 cm) stalk. Leaves of this plant have been used for salves to treat skin irritation and to make a tea for treatment of diarrhea. Note: this genus also contains some native species.

Ecological Damage: Can form dense infestations.

How it spreads: Reproduces both by seed and lateral shoots. Some buried seeds can survive for up to 20 years. Seeds generally fall near the parent plant and can be transported by water, soil movement, and human activities. Seeds become sticky when moistened.

Removal: Remove by digging out the entire root mass to prevent resprouts.

Plantaginaceae



Fennel

Scientific Name: Foeniculum vulgare Origin: Mediterranean region and southwestern Asia Cal-IPC statewide impact rating: High Apiaceae



Description: Fennel is an erect perennial herb with a strong anise-like odor. Leaves are pinnately compound into thread-like, slender divisions. Small, yellow flowers are arranged in a compound umbel.

Ecological Damage: Can alter natural fire regimes; creates an intense, fast-moving fire if ignited. Fennel excludes almost all other vegetation once it is firmly established. It alters the vertical complexity of grassland communities and excludes many grassland species.

How it spreads: Disturbance facilitates the spread of fennel which is a prolific seed producer. Mature plants can produce hundreds of thousands of seeds per plant. Seeds can be spread by cultivation equipment, agricultural produce, livestock, and humans (on clothing). Fennel can also reproduce by root division

Removal: Fennel can be successfully removed by deep cultivation. Remove plants before seed set to prevent spread. Chemical control by spot spraying with Garlon (Triclopyr) has also been shown to be effective.



Scientific Name: *Erodium botrys, E. cicutarium, E. moschatum* Origin: Europe or the Mediterranean Cal-IPC statewide impact rating: Limited (*Erodium cicutarium*) Geraniaceae



broad leaf filaree seedling

Description: There are several invasive annual filaree species. Leaves are lobed to dissected or compound. Flowers have 5 red-lavender petals. Fruit is 5-lobed and long-beaked, with each lobe splitting away at maturity. Note: this genus also contains some native species, but they are not currently found at Storke Ranch.

Ecological Damage: May be able to out-compete native species.

How it spreads: Needs disturbance (natural or human-caused) for establishment. Produces 2,400-9,900 seeds/plant. Seeds can be dispersed by water and by clinging to maintenance equipment, people, or animals.

Removal: Remove by hand before seed set, or use solarization.

Hyssop Loosestrife

Scientific Name: Lythrum hyssopifolium Origin: Europe Cal-IPC statewide impact rating: Moderate Lythraceae



Description: Hyssop loosestrife is a summer annual that can grow up to 2 feet (0.6 m) tall. It is a common weed of seasonal wetlands. Stems are prostrate to erect and generally reddish. Flowers have pink to lavender colored petals, 0.08 to 0.2 inches (2-5 mm) long. Lower leaves are opposite and upper leaves are generally alternate, 0.2 to 1.2 inches (5-30 mm) long. Note: this genus also contains a native species, California loosestrife (*L. californicum*), which is not currently found at Storke Ranch.

Ecological Damage: Hyssop loosestrife is highly

competitive during early stages of succession but lacks long-term competitive ability.

How it spreads: Plants produce an estimated 3,200 seeds per plant. Seeds can survive 14 years under laboratory conditions. Seeds can be transported on shoes and on the feet and fur of animals.

Removal: Remove by hand before seed set. Use a hula hoe on young plants. Remove all vegetation to prevent resprouts from roots and stems left in contact with damp soil.

Mustard; Black, Field, and Mediterranean Hoary

Scientific Name: *Brassica nigra*, *B. rapa*, and *Hirschfeldia incana* Origin: Europe Cal-IPC statewide impact rating: Moderate



Upper leaves are mostly simple, not clasping the stem.

Ecological Damage: Toxic chemicals from plants leach into the soil and prevent germination of many native species.

How it spreads: Seeds are sticky when wet, facilitating dispersal by humans; may also be dispersed by rodents.

Removal: Pull by hand before seed set. Field mustard and Mediterranean hoary mustard can survive more than one season, so remove entire root to prevent re-growth.



Brassicaceae

Prickly Lettuce

Scientific Name: *Lactuca serriola* Origin: Eurasia Cal-IPC statewide impact rating: Evaluated but not listed



Description: Prickly lettuce is a winter annual with milky sap and a large taproot. The main stem grows 1 to 5 feet tall branching in the flowering portion. The leaves are twisted at the base to lie in a vertical plane and have spines along the lower side of the midrib. Leaves have toothed edges or are coarsely lobed and clasp the stem with 2 angled lobes. Flower heads are yellow and have ray flowers only.

Ecological Damage: Prickly lettuce is not thought to be highly competitive. Young plants can cause pulmonary emphysema in cattle, but wildlife impacts are unknown.

How it spreads: Seeds are probably primarily wind dispersed.

Removal: Remove by hand before seed set.

Asteraceae

Scarlet Pimpernel

(Poor-man's weatherglass)

Scientific Name: *Anagallis arvensis* Origin: Europe Cal-IPC statewide impact rating: Not Evaluated Primulaceae Myrsinaceae



Description: Scarlet pimpernel is a low, spreading annual herb. Stems are 2 to 16 inches. Leaves are opposite or whorled with blades 1/5 - 4/5 inches, oval to elliptical. Flowers have 0.4 - 1.2 inch long pedicels and are usually salmon colored but sometimes are blue or bluish white. This genus also contains a native plant, chaffweed (A. minima) that may be found in vernal pools. It has pink flowers that are much less showy than those of scarlet pimpernel and generally

have no pedicels.

Ecological Damage: Toxic to livestock and humans.

How it spreads: Seed can remain viable in the soil for at least 10 years and may be spread by birds.

Removal: Pull by hand before seed set.

Sheep Sorrel

Scientific Name: *Rumex acetosella* Origin: Europe Cal-IPC statewide impact rating: Moderate Polygonaceae



Description: Sheep sorrel is a perennial herb ¹/₂-2 feet tall that spreads by rhizomes and is common in moist places and annual and perennial grasslands in California. Leaves are mostly basal and somewhat arrow-shaped. The slender leaf stalk has a papery sheath where it attaches to the stem. Orange-yellow male flowers and red-orange female flowers are housed on different plants (dioecious). Note: this genus also contains some native species.

Ecological Damage: Displaces native grasses and forbs by root competition and shading and can form large, dense stands. Toxic to domestic livestock and

may be toxic to other mammals.

How it spreads: Thrives on disturbed soils; spreads by underground rhizomes and seeds. Seed may be dispersed by human activities, water, and animals.

Removal: Because it spreads by rhizomes, this species is difficult to remove by hand. Repeated, frequent removal with a shovel, attempting to remove all root material, might be effective over time but is not feasible for large infestations. For large infestations, spray with herbicide in the spring.

Sowthistle; Perennial, Prickly, and Common

Scientific Name: Sonchus arvensis, Sonchus asper, Sonchus oleraceus Origin: Europe

Cal-IPC statewide impact rating: Evaluated but not listed





Description: Sowthistles are common garden weeds. The seed leaves are almost spoon-shaped with a distinct stalk. Later leaves have prickles or teeth along the margin and often have a winged stalk. Flowers are yellow and mature into fluffy white seed heads. Stems are hollow and secrete milky sap when cut open.

Ecological Damage: Some sowthistles are highly competitive and can rapidly colonize new sites by vegetative reproduction.

How it spreads: Thrives in disturbed sites with damp soil; reproduces by wind-dispersed seed and vegetative shoots from roots. Seed can also be dispersed by water or by clinging to clothing, fur or feathers.

Removal: Remove entire plant, including root mass, by pulling out or digging.

Asteraceae

Vetch

Scientific Name: Vicia sp. Origin: Europe Cal-IPC statewide impact rating: Evaluated but not listed Fabaceae



Description: There are a variety of annual vetches that are invasive in and around vernal pools including purple vetch (*V. benghalensis*), spring vetch (*V. sativa*), and hairy vetch (*V. villosa*). All are sprawling or climbing vines that can form dense mats and have pinnately divided compound leaves with tendrils at the end. They vary in the color, size, shape, and number of flowers per inflorescence and the size and shape of the leaves. Note: this genus also contains some native

species.

Ecological Damage: Unknown

How it spreads: Spreads by seed which may be carried by animals.

Removal: Remove plants by hand before seed set. Solarization is generally not effective on this species.

Wild Radish

Scientific Name: *Raphanus sativus* Origin: Mediterranean Europe Cal-IPC statewide impact rating: Limited Brassicaceae



Description: Wild radish is an annual or sometimes biennial herb 1-4 feet (4-12 dm) tall. Seed leaves are broad and heart-shaped. Leaves are mostly basal; lower leaves are pinnately divided with a large terminal segment. Flowers are $\frac{3}{4}$ inch (15-25 mm) wide and range from white to purple or yellow brown in color with veins of varied colors. Seed pods are pithy, 1.5-3 inches (3-6 cm) long, and about $\frac{1}{4}$ inch (5-10 mm) in diameter, with 2-8 seeds.

Ecological Damage: Can cause digestive tract irritation in livestock.

How it spreads: Fruits and seeds can disperse with human activities.

Removal: Pull out by hand when soil is moist in the winter or spring. Where natives are not present, seedlings can be killed by solarization in fall to early winter.

Plant Table

Plants found in the Storke Ranch open space. This table includes plants presently found and historically found in the Storke Ranch open space.

Scientific Name	Common Name	Family	Lifeform	Status	Local
					Concern
Agrostis sp.	Bentgrass	Poaceae	perennial herb	Non-native	No
Alopecurus saccatus	Pacific foxtail	Poaceae	annual herb	Native	Yes
Ambrosia psilostachya var. californica	Western ragweed	Asteraceae	perennial herb	Native	No
Anagallis arvensis	Scarlet pimpernel	Primulaceae	annual herb	Non-native	No
Anagallis minimus	False pimpernel	Primulaceae	annual herb	Native	Yes
Artemisia californica	California sagebrush	Asteraceae	shrub	Native	No
Arthrocnemum subterminale	Glasswort; Pickleweed	Chenopodiaceae	perennial herb	Native	Yes
Asclepias fascicularis	Milkweed	Asclepiadaceae	perennial herb	Native	No
Atriplex semibaccata	Australian saltbush	Chenopodiaceae	perennial herb	Non-native	No
Atriplex triangularis	Spearscale	Chenopodiaceae	annual herb	Native	No
Atriplex watsonii	Watson's saltbush	Chenopodiaceae	perennial herb	Native	Yes
Avena barbata	Slender wild oat	Poaceae	annual herb	Non-native	No
Avena fatua	Wild oat	Poaceae	annual herb	Non-native	No
Baccharis pilularis	Coyote brush	Asteraceae	shrub	Native	No
Baccharis salicifolia	Mule fat	Asteraceae	shrub	Native	No
Bolboschoenus maritimus	Prairie bulrush	Cyperaceae	perennial herb	Native	No
Brassica nigra	Black mustard	Brassicaceae	annual herb	Non-native	No
Brassica rapa ssp. sylvestris	Field mustard	Brassicaceae	annual herb	Non-native	No
Bromus catharticus	Rescue grass	Poaceae	annual herb	Non-native	No
Bromus diandrus	Ripgut brome	Poaceae	annual herb	Non-native	No
Bromus madritensis ssp. rubens	Red Brome	Poaceae	annual herb	Non-native	No
Bromus mollis	Soft brome; Soft chess	Poaceae	annual herb	Non-native	No
Bromus tectorum	Cheat grass	Poaceae	annual herb	Non-native	No
Calandrinia ciliata	Red maids	Portulacaceae	annual herb	Native	No
Scientific Name	Common Name	Family	Lifeform	Status	Local Concern
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Callistemon sp.	Bottlebrush	Myrtaceae	tree	Non-native	No
Callitriche marginata	California water starwort	Callitrichaceae	annual herb	Native	Yes
Calystegia macrostegia ssp. cyclostegia	Morning-glory	Convolvulaceae	perennial herb	Native	No
Calystegia purpurata	Morning-glory	Convolvulaceae	perennial herb	Native	No
Camissonia strigulosa	Evening primrose	Onagraceae	annual herb	Native	No
Carduus pycnocephalus	Italian thistle	Asteraceae	annual herb	Non-native	No
Castilleja densiflora	Dense flower owl's clover	Scrophulariaceae	annual herb	Native	No
Centromadia parryi ssp. Australis	Southern tarplant	Asteraceae	annual herb	Native	Yes
Chenopodium californicum	California goosefoot	Chenopodiaceae	perennial herb	Native	No
Cirsium vulgare	Bull thistle	Asteraceae	perennial herb	Non-native	No
Convolvulus arvensis	Bindweed	Convolvulaceae	perennial herb	Non-native	No
Conyza canadensis	Horseweed	Asteraceae	annual herb	Non-native	No
Conyza coulteri	Coulter's horseweed	Asteraceae	annual herb	Native	No
Cortaderia jubata	Purple pampas grass	Poaceae	perennial herb	Non-native	No
Cortaderia selloana	Pampas grass	Poaceae	perennial herb	Non-native	No
Cotula coronopifolia	Brass buttons	Asteraceae	perennial herb	Non-native	No
Crassula aquatica	Water pygmyweed	Crassulaceae	annual herb	Native	Yes
Cressa truxillensis var. vallicola	Alkali weed	Convolvulaceae	perennial herb	Native	No
Crypsis schoenoides	Swamp pricklegrass	Poaceae	annual herb	Non-native	No
Cupressus macrocarpa	Monterey cypress	Cupressaceae	tree	Native	No
Cynara scolymus	Artichoke	Asteraceae	perennial herb	Non-native	No
Cynodon dactylon	Bermuda grass	Poaceae	perennial herb	Non-native	No
Cyperus eragrostis	Tall flatsedge	Cyperaceae	perennial herb	Native	No
Deinandra fasciculata	Fascicled tarweed	Asteraceae	annual herb	Native	No
Deinandra increscens ssp. increscens	Grassland tarweed	Asteraceae	annual herb	Native	No
Distichlis spicata var. spicata	Saltgrass	Poaceae	perennial herb	Native	No
Elatine brachysperma	Short seed waterwort	Elatinaceae	annual herb	Native	Yes
Eleocharis acicularis	Needle spikerush	Cyperaceae	perennial herb	Native	No
Eleocharis macrostachya	Common spikerush	Cyperaceae	perennial herb	Native	No
Encelia californica	California encelia	Asteraceae	shrub	Native	No

Scientific Name	Common Name	Family	Lifeform	Status	Local Concern
Epilobium ciliatum	Slender willow herb	Onagraceae	perennial herb	Native	No
Epilobium pygmaeum	Smooth spike-primrose	Onagraceae	annual herb	Native	Yes
Eremocarpus setigerus	Dove weed	Euphorbiaceae	annual herb	Native	No
Erodium botrys	Broad leaf filaree	Geraniaceae	annual herb	Non-native	No
Erodium cicutarium	Redstem filaree	Geraniaceae	annual herb	Non-native	No
Erodium moschatum	Whitestem filaree	Geraniaceae	annual herb	Non-native	No
Eryngium armatum	Prickly coyote-thistle	Apiaceae	perennial herb	Native	Yes
Eryngium vaseyi	Coyote-thistle	Apiaceae	perennial herb	Native	No
Eucalyptus sp.	Eucalyptus	Myrtaceae	tree	Non-native	No
Euthamia occidentalis	Western goldenrod	Asteraceae	perennial herb	Native	No
Festuca rubra	Red fescue	Poaceae	perennial herb	Non-native	No
Foeniculum vulgare	Fennel	Apiaceae	perennial herb	Non-native	No
Frankenia grandifolia	Alkali heath	Frankeniaceae	perennial herb	Native	No
Geranium dissectum	Cut-leaved geranium	Geraniaceae	annual herb	Non-native	No
Gnaphalium californicum	California Everlasting	Asteraceae	annual herb	Native	No
Gnaphalium luteo-album	Everlasting Cudweed	Asteraceae	annual herb	Non-native	No
Gnaphalium palustre	Western marsh cudweed	Asteraceae	annual herb	Native	No
Gnaphalium ramosissimum	Pink everlasting	Asteraceae	biennial herb	Native	No
Grindelia camporum	Gumplant	Asteraceae	perennial herb	Native	No
Heliotropium curassavicum	Salt heliotrope	Boraginaceae	perennial herb	Native	No
Helminthotheca echioides	Bristly ox tongue	Asteraceae	annual herb	Non-native	No
Heteromeles arbutifolia	Toyon	Rosaceae	shrub	Native	No
Heterotheca grandiflora	Telegraph weed	Asteraceae	annual herb	Native	No
Hirschfeldia incana	Mediterranean hoary mustard	Brassicaceae	perennial herb	Non-native	No
Hordeum brachyantherum ssp. branchyantherum	Meadow barley	Poaceae	perennial herb	Native	Yes
Hordeum branchyantherum ssp. californicum	California barley	Poaceae	perennial herb	Native	No
Hordeum marinum	Mediterranean barley	Poaceae	annual herb	Non-native	No

Scientific Name	Common Name	Family	Lifeform	Status	Local Concern
Hordeum murinum	Foxtail barley	Poaceae	annual herb	Non-native	No
Hypochoeris glabra	Smooth cat's ear	Asteraceae	annual herb	Non-native	No
Isocoma menziesii	Coast goldenbush	Asteraceae	shrub	Native	No
Jaumea carnosa	Jaumea	Asteraceae	perennial herb	Native	No
Juncus balticus	Wire rush	Juncaceae	perennial herb	Native	No
Juncus bufonius	Common toad rush	Juncaceae	annual herb	Native	No
Juncus mexicanus	Mexican rush	Juncaceae	perennial herb	Native	No
Juncus occidentalis	Western rush	Juncaceae	perennial herb	Native	No
Juncus patens	Common rush	Juncaceae	perennial herb	Native	No
Juncus phaeocephalus	Brown-headed rush	Juncaceae	perennial herb	Native	No
Juncus textilis	Indian rush	Juncaceae	perennial herb	Native	No
Lactuca serriola	Prickly lettuce	Asteraceae	annual herb	Non-native	No
Lathyrus laetiflorus ssp. laetiflorus	Chaparral pea	Fabaceae	perennial herb	Native	No
Lavatera cretica	Mallow	Malvaceae	annual herb	Non-native	No
Lolium multiflorum	Italian rye grass	Poaceae	annual herb	Non-native	No
Lotus purshianus	Spanish clover	Fabaceae	annual herb	native	No
Lupinus bicolor ssp. microphyllus	Sky lupine; Annual lupine	Fabaceae	annual herb	Native	No
Lythrum hyssopifolium	Hyssop loosestrife	Lythraceae	annual herb	Non-native	No
Madia sativa	Coast tarweed	Asteraceae	annual herb	Native	No
Malva nicaeensis	Mallow	Malvaceae	annual herb	Non-native	No
Malva parviflora	Cheeseweed	Malvaceae	annual herb	Non-native	No
Malvella leprosa	Alkali mallow	Malvaceae	perennial herb	Native	No
Matricaria matricarioides	Pineapple weed	Asteraceae	annual herb	Non-native	No
Medicago polymorpha	Bur-clover	Fabaceae	annual herb	Non-native	No
Melilotus alba	White sweet-clover	Fabaceae	annual herb	Non-native	No
Melilotus indicus	Yellow sweet-clover	Fabaceae	annual herb	Non-native	No
Mimulus aurantiacus	Sticky monkeyflower	Scrophulariaceae	shrub	Native	No
Nassella pulchra	Purple needlegrass	Poaceae	perennial herb	Native	No
Oenothera elata	Hooker's evening primrose	Onagraceae	perennial herb	Native	No
Orthocarpus purpurascens var. purpurescens	Owl's clover	Scrophulariaceae	annual herb	Native	No

Scientific Name	Common Name	Family	Lifeform	Status	Local Concern
Oxalis pes-caprae	Bermuda buttercup	Oxalidaceae	perennial herb	Non-native	No
Parapholis incurva	Sickle grass	Poaceae	annual herb	Non-native	No
Paspalum dilatatum	Dallisgrass	Poaceae	perennial herb	Non-native	No
Phalaris aquatica	Harding grass	Poaceae	perennial herb	Non-native	No
Phalaris lemmonii	Lemmon's canarygrass	Poaceae	annual herb	Native	Yes
Phoenix sp.	Date palm	Arecaceae	tree	Non-native	No
Pilularia americana	Pillwort	Marsileaceae	fern	Native	Yes
Piptatherum miliaceum	Smilo grass	Poaceae	perennial herb	Non-native	No
Plagiobothrys undulatus	Coast allocarya	Boraginaceae	annual herb	Native	Yes
Plantago bigelovii ssp. bigelovii	Coastal plantain	Plantaginaceae	annual herb	Native	Yes
Plantago lanceolata	English plantain	Plantaginaceae	perennial herb	Non-native	No
Plantago major	Common plantain	Plantaginaceae	perennial herb	Non-native	No
Platanus racemosa	Western sycamore	Platanaceae	tree	Native	No
Polygonum arenastrum	Common knotweed	Polygonaceae	annual herb	Non-native	No
Polypogon monspeliensis	Rabbitfoot grass	Poaceae	annual herb	Non-native	No
Populus balsamifera ssp. trichocarpa	Black cottonwood	Salicaceae	tree	Native	No
Psilocarphus brevissimus	Woolly marbles	Asteraceae	annual herb	Native	Yes
Quercus agrifolia	Coast live oak	Fagaceae	tree	Native	No
Raphanus raphanistrum	Painted charlock	Brassicaceae	annual herb	Non-native	No
Raphanus sativus	Wild radish	Brassicaceae	annual herb	Non-native	No
Rhus integrifolia	Lemonade berry	Anacardiaceae	shrub	Native	No
Rosa californica	California wild rose	Rosaceae	shrub	Native	No
Rubus discolor	Himalayan blackberry	Rosaceae	shrub	Non-native	No
Rubus ursinus	California blackberry	Rosaceae	shrub	Native	No
Rumex acetosella	Sheep sorrel	Polygonaceae	perennial herb	Non-native	No
Rumex crispus	Curly dock	Polygonaceae	perennial herb	Non-native	No
Salicornia virginica	Pickleweed	Chenopodiaceae	perennial herb	Native	No
Salix sp.	Willow	Salicaceae	tree	Native	No
Salix lasiolepis var. lasiolepis	Arroyo willow	Salicaceae	tree	Native	No
Salsola tragus	Russian thistle	Chenopodiaceae	annual herb	Non-native	No

Scientific Name	Common Name	Family	Lifeform	Status	Local Concern
Sambucus mexicana	Blue elderberry	Caprifoliaceae	tree	Native	No
Schoenoplectus californicus	California bulrush	Cyperaceae	perennial herb	Native	No
Scirpus robustus	Big bulrush	Cyperaceae	perennial herb	Native	Yes
Silene gallica	Windmill pink	Caryophyllaceae	annual herb	Non-native	No
Silybum marianum	Milk thistle	Asteraceae	annual herb	Non-native	No
Sisyrinchium bellum	Blue-eyed grass	Iridaceae	perennial herb	Native	No
Sonchus arvensis	Perennial sowthistle	Asteraceae	perennial herb	Non-native	No
Sonchus asper	Prickly sowthistle	Asteraceae	annual herb	Non-native	No
Sonchus oleraceus	Common sowthistle	Asteraceae	annual herb	Non-native	No
Sorghum bicolor	Sorghum	Poaceae	annual herb	Non-native	No
Spergula arvensis	Corn spurrey	Caryophyllaceae	annual herb	Non-native	No
Spergularia bocconii	Sand spurrey	Caryophyllaceae	annual herb	Non-native	No
Stachys ajugoides	Bugle hedge nettle	Lamiaceae	perennial herb	Native	No
Stellaria media	Common chickweed	Caryophyllaceae	annual herb	Non-native	No
Suaeda californica	California seablite	Chenopodiaceae	shrub	Native	No
Symphyotrichum subulatum var. ligulatum	Slender aster	Asteraceae	annual herb	Native	Yes
Tamarix aphylla	Tamarisk	Tamaricaceae	tree	Non-native	No
Toxicodendron diversiloba	Poison oak	Anacardiaceae	shrub	Native	No
Tragopogon porrifolius	Salsify	Asteraceae	perennial herb	Non-native	No
Trifolium hirtum	Rose clover	Fabaceae	annual herb	Non-native	No
Trifolium microcephalum	Small headed clover	Fabaceae	perennial herb	Non-native	No
Typha latifolia	Cattail	Typhaceae	perennial herb	Native	No
Veronica peregrina ssp. xalapensis	Neckweed	Scrophulariaceae	annual herb	Native	Yes
Vicia benghalensis	Purple vetch	Fabaceae	annual herb	Non-native	No
Vicia sativa	Spring vetch	Fabaceae	annual herb	Non-native	No
Vicia sativa ssp. nigra	Smaller common vetch	Fabaceae	annual herb	Non-native	No
Vulpia sp.	Fescue	Poaceae	annual herb	Non-native	No
Xanthium strumarium var. canadense	Cocklebur	Asteraceae	annual herb	Native	No

Resources

Plants

Calflora

Website with photos and descriptions of California wild plants (native plants and weeds). This site has a nice search engine. www.calflora.org

California Invasive Plant Council (Cal-IPC)

This organization has a website with extensive information about invasive plants in California. (510) 843-3902 www.cal-ipc.org

California Native Plant Society

This organization has an online rare plant inventory and a manual of California vegetation. They also provide workshops.

www.cnps.org

Growing Solutions Restoration Education Institute

Custom seed collection and propagation of native plants for restoration projects. (805) 452-7561 www.growingsolutions.org

Santa Barbara Weed Management Area. Santa Barbara Agricultural Commissioners Office

Multi-agency coalition concerned with the invasion of farms, rangeland, and native plant and animal habitat by non-native weeds. Website includes many grant and educational resources.

(805) 681-5600

http://www.countyofsb.org/agcomm/wma/index.htm

Invasipedia

Information on the management of invasive plants, animals, and pathogens. http://wiki.bugwood.org/Invasipedia

The California Department of Pesticide Regulation (DPR)

Responsible for examining and licensing qualified pesticide applicators and for certifying applicators that use or supervise the use of restricted pesticides. (including herbicides). <u>www.cdpr.ca.gov</u>

Granting Agencies

(These are the granting agencies that supported restoration efforts at Storke Ranch. For a more comprehensive list of grant resources, see the Santa Barbara Weed Management Area website: http://www. countyofsb.org/agcomm/wma/index.htm).

US Fish and Wildlife Service – Partners for Fish and Wildlife Program Mary Root Ventura Fish and Wildlife Office (VFWO) Conservation Partnerships Coordinator (805) 644-1766, ext. 233 www.fws.gov/ventura/endangered/cpartnerships/ Southern California Wetlands Recovery Project – Community Wetland Restoration Grants Program http://www.scwrp.org/

Coastal Fund, UC Santa Barbara, Associated Students <u>http://coastalfund.as.ucsb.edu/</u>

Permits

Guide to Watershed Project Permitting for the State of California. California Association of Resource Conservation Districts 3823 V Street, Suite 3 Sacramento, California 95817 (916) 457-7904 • Fax (916) 457-7934 www.carcd.org

U.S. Army Corps of Engineers Ventura Field Office (805) 585-2140

California Coastal Commission – Coastal Development Permit South Central Coast District (805) 585-1800 California Department of Fish and Game Region 5 (South Coast Region) 4949 View Ridge Ave. (858) 467-4201

California Regional Water Quality Control Board Central Coast Region San Luis Obispo, CA (805) 549-3147

City of Goleta Planning Department (805) 961-7543

Glossary

Acute: sharp, pointed.

- Allelopathic: A plant that emits chemicals that retard the growth or seed germination of other plants.
- Alternate: Leaves that are staggered, one per stem node, not placed directly across from each other on the stem.
- Annual: A plant that completes its entire life cycle within one year – germinates, grows, flowers, sets seed, and dies.
- Anther: The male part of a flower which produces the pollen.
- Awn: A stiff bristle-like appendage of a plant, commonly seen projecting from the tip of a floret in grasses.
- Basal: Borne at or near the base.
- **Biennial**: A plant with a life cycle that is completed in two years.
- **Bract**: A modified leaf growing just below a flower or cluster of flowers.

Bractlet: A secondary bract.

Compound leaf: A leaf composed of multiple leaflets.

- **Dicot**: A subdivision of flowering plants whose members produce two seed leaves (cotelydons). These plants have net-like leaf veins and flower parts in multiples of four or five.
- **Dioecious**: Having male and female flowers on separate plants.
- **Disk flower**: A small, five petaled flower found in the center, or disk, of a larger, composite flower, such as a sunflower.
- Elliptic: Widest at the middle and tapering equally toward both ends; tapered oval.
- Floret: The smallest unit of a compound flower. The term used for a grass flower.
- **Forb**: A broad-leaved herbaceous plant (an herbaceous plant other than a grass, sedge, or other grass-like plant).
- **Genus**: A taxonomic rank for organisms that is above the level of species, used to group species with common attributes.

- **Glume**: A bract (usually in pairs) at the base of a grass spikelet.
- Herb: A plant lacking a permanent woody stem.
- Inflorescence: A cluster of flowers on a plant.
- **Invasive**: A plant that establishes easily and spreads aggressively into new areas and environments, often with detrimental effects on native plant species.
- Lanceolate: Lance-shaped, much longer than wide, tapering toward the tip.
- Leaflet: Leaf-like divisions of a compound leaf.
- **Lemma**: The lower of two bracts of a grass floret.
- Ligule: In grasses, the thin outgrowth from the inner surface of a leaf where the sheath and leaf blade join.
- **Loamy soil**: Loam is soil composed of sand, silt, and clay in relatively even concentration and is generally favorable to plant growth.
- **Lobed**: Divided into segments with spaces between which do not reach the center.
- Monocot: A subdivision of flowering plants whose members produce a single seed leaf (cotelydon). Monocots include grasses, rushes, and sedges. These plants have parallel major leaf veins and flower parts in multiples of three.
- **Native**: A plant that is naturally found in an area (as opposed to a plant that people introduced into an area).
- **Node**: The small swelling that is the part of a plant stem from which one or more leaves or branches emerge.
- **Non-native**: A plant that has been introduced into an area directly or indirectly by people.
- **Oblanceolate**: A leaf shape that is widest near the tip and tapers to a narrower base.
- **Oblong**: Longer than broad, with nearly parallel sides.
- **Obovate**: Egg shaped, widest toward tip. The opposite of ovate.
- **Opposite**: Leaves that are situated directly across the stem from each other, two per stem node.

Ovate: Egg shaped, widest toward the base.

Panicle: An elongated, branched flower cluster.

Flowers are borne on stalks that branch off larger stalks.

Pedicel: The stalk of an individual flower.

- **Perennial**: A plant that continues to live and grow year to year. Some plants die back to the ground each year and initiate new growth in the spring, while others retain green leaves year round.
- **Petals**: Modified leaves surrounding the reproductive parts in a flower. They are usually colored or white.
- **Pinnately compound**: Compound leaves in which the leaflets are arranged along each side of the main vein.
- **Pinnately lobed**: Leaves that have indentations arranged along each side of the main vein, with lobes not entirely separate from each other.
- **Ray flower**: The petal-like flowers surrounding the central disk of some composite inflorescences.
- **Rhizomatous**: A plant that produces rhizomes and can thus spread vegetatively.
- Rhizome: A horizontal underground stem.
- Sepals: The leaf-like structures located beneath the petals of a flower that protect the developing flower bud.
- Sheath: The lower part of the leaf that encloses the stem.
- Spike: A long, slender floral structure with individual flowers directly attached to the stalk.
- Spikelet: A grass inflorescence usually composed of one or more florets subtended by two glumes.
- **Stigma**: The tip of the female part of a flower, which receives the pollen grains.
- **Stolon**: A stem that runs along the soil surface and can produce roots and shoots at the nodes, giving rise to additional plants.
- **Strigose**: With stiff, straight, sharp hairs parallel to the surface.
- **Style**: Slender column that arises from the ovary of a plant and supports the stigma.

- **Tomentose**: Covered with densely interwoven, generally matted hairs.
- **Tufted**: Describes a grass that grows in a compact cluster attached at the base.
- **Umbel**: An umbrella shaped inflorescence, with pedicels all arising from the same point.
- Vernal pool: Shallow, temporary pool of water found in a landscape depression underlain by impermeable soils.
- **Whorled**: Three or more leaves, bracts, branches, or flowers in a circular arrangement originating from the same point.

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Index: Plants by Name

Alopecurus saccatus (A. howellii), 16, 64 Anagallis arvensis, 59, 64 Atriplex semibaccata, 46, 64 Australian saltbush, 46, 64 Avena barbata, 45, 64 Avena fatua, 45, 64 Barley, California, 10, 11, 37, 66 Barley, foxtail, 37, 67 Barley, meadow, 10, 11, 37, 66 Barley, Mediterranean, 37, 66 Bermuda grass, 6, 7, 20, 38, 65 Bindweed, 47, 65 Blue-eyed grass, 12, 69 Bolboschoenus maritimus, 14, 64 Brass buttons, 48, 65 Brassica nigra, 57, 64 Brassica rapa, 57, 64 Bristly ox tongue, 36, 49, 66 Bromus diandrus, 43, 64 Brown-headed rush, 18, 67 Bur-clover, 50, 67 Calandrinia ciliata, 29, 64 California bulrush, 13, 69 California water starwort, 24, 65 Callitriche marginata, 24, 65 Centromadia parryi ssp. australis, 33, 65 Coast allocarya (coast popcorn flower), 25, 68 Common spikerush, 4, 21, 65 Convolvulus arvensis, 47, 65 Cortaderia jubata, 41, 65 Cortaderia selloana, 41, 65 Cotula coronopifolia, 48, 65 Coyote-thistle, 26, 27, 66 Coyote-thistle, prickly, 27, 66 Crassula aquatica, 34, 65 Curly dock, 3, 6, 51, 68 Cut-leaved geranium, 3, 52, 66 Cynodon dactylon, 38, 65 Cyperus eragrostis, 23, 65 Distichlis spicata, 20, 38, 65 Elatine brachysperma, 30, 65 Eleocharis acicularis, 22, 65

Eleocharis macrostachya, 4, 21, 65, 68 English plantain, 3, 53 Epilobium pygmaeum, 32, 66 Erodium botrys, 55, 66 Erodium cicutarium, 55, 66 Erodium moschatum, 55, 66 Eryngium armatum, 27, 66 Eryngium vaseyi, 26, 66 Fennel, 1, 54, 66 Filaree, broad leaf, 55, 66 Filaree, redstem, 55, 66 Filaree, whitestem, 55, 66 Foeniculum vulgare, 54, 66 Geranium dissectum, 52, 66 Grindelia camporum, 28, 66 Gumplant, 28, 66 Harding grass, 39, 68 Helminthotheca echioides, 49, 66 Hirschfeldia incana, 57, 66 Hordeum brachyantherum ssp. branchyantherum, 11,66 Hordeum branchyantherum ssp. californicum, 10, 66 Hordeum marinum, 37, 66 Hordeum murinum, 37, 66 Hyssop loosestrife, 3, 56, 67 Italian rye grass, 3, 40, 67 Juncus occidentalis, 19, 67 Juncus phaeocephalus, 18, 67 Lactuca serriola, 58, 67 Lemmon's canarygrass, 15, 39, 68 Lolium multiflorum, 40, 67 Lythrum hyssopifolium, 56, 67 Medicago polymorpha, 50, 67 Mustard, black, 57, 64 Mustard, field, 57, 64 Mustard, Mediterranean hoary, 57, 64 Nassella pulchra, 17, 67 Needle spikerush, 22, 65 Pacific foxtail, 16, 64 Pampas grass, 41, 65 Phalaris aquatica, 39, 68 Phalaris lemmonii, 15, 39, 68

Plantago lanceolata, 53, 68 Polypogon monspeliensis, 42, 68 Prairie bulrush, 14, 64 Prickly lettuce, 58, 67 Psilocarphus brevissimus, 35, 68 Purple needlegrass, 17, 43, 67 Purple pampas grass, 41, 65 Rabbitfoot grass, 3, 42, 68 Raphanus sativus, 3, 68 Red maids, 29, 64 Ripgut brome, 3, 43, 64 Rumex acetosella, 60, 68 Rumex crispus, 51, 68 Saltgrass, 20, 38, 65 Scarlet pimpernel (poor-man's weatherglass), 59, 64 Schoenoplectus californicus, 13, 69 Scirpus californicus, 13 Sheep sorrel, 60, 68 Short seed waterwort, 30, 65 Sisyrinchium bellum, 12, 69 Slender aster, 31, 69 Smilo grass, 44, 68 Smooth spike-primrose (pygmy epilobium), 32, 66 Sonchus arvensis, 61, 69 Sonchus asper, 61, 69 Sonchus oleraceus, 61, 69 Southern tarplant, 33, 65 Sowthistle, annual, 61, 69 Sowthistle, perennial, 61, 69 Sowthistle, prickly, 61, 69 Symphyotrichum subulatum var. ligulatum, 31, 69 Tall flatsedge, 23, 65 Vetch, 3, 62, 69 *Vicia*, 62, 69 Water pygmyweed, 34, 65 Western rush, 19, 67 Wild oat, 45, 64 Wild radish, 63, 68 Woolly marbles, 35, 68

Piptatherum miliaceum, 44, 68 Plagiobothrys undulatus, 25, 68