

Beautify Lunada Bay Project Phase 1



FEBRUARY 2016

PREPARED BY:



**Palos Verdes Peninsula
Land Conservancy**
916 Silver Spur Road, Suite 207
Rolling Hills Estates, CA 90274

and



Dudek
605 Third Street
Encinitas, CA 92024

HABITAT RESTORATION PLAN
for the
Beautify Lunada Bay Project – Phase I

Prepared for:

Lunada Bay Homeowners Association

Prepared by:

DUDEK

605 Third Street
Encinitas, California 92024

Contact: Andy Thomson
760.479.4282

and

Palos Verdes Peninsula Land Conservancy

916 Silver Spur Road, Suite 207
Rolling Hills Estates, California 90274
Contact: Andrea Vona or Adrienne Mohan

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Habitat Restoration Plan for the Lunada Bay Restoration Project

1 INTRODUCTION

This Habitat Restoration Plan (HRP) was prepared for the Lunada Bay Restoration Site within the City of Palos Verdes Estates, California (City; Figures 1 and 2). The Lunada Bay Restoration Site presents an opportunity to the City to restore a degraded parcel to native and drought tolerant habitat and improve the site as a natural community amenity. The site offers views of the Pacific Ocean, approximately 1,500 feet away, and contains an informal recreational path used by the community.

This HRP discusses implementing habitat restoration of approximately 1.0 acre of land within an area currently considered disturbed, non-native habitat. The HRP provides a conceptual restoration design, planting recommendations, installation procedures and maintenance and monitoring guidelines. This HRP was prepared assuming that the City would rely primarily on volunteer community support to implement, with assistance from the City, the Lunada Bay Homeowners Association (LBHOA) and oversight from the Palos Verdes Peninsula Land Conservancy (PVPLC).

The proposed habitat restoration in this HRP describes the first phase of the Beautify Lunada Bay Project. Additional phases of habitat restoration at this and adjoining sites may be pursued by Lunada Bay Homeowners Association and the City at a later time.

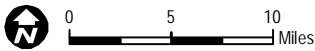
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Project Site

Pacific
Ocean



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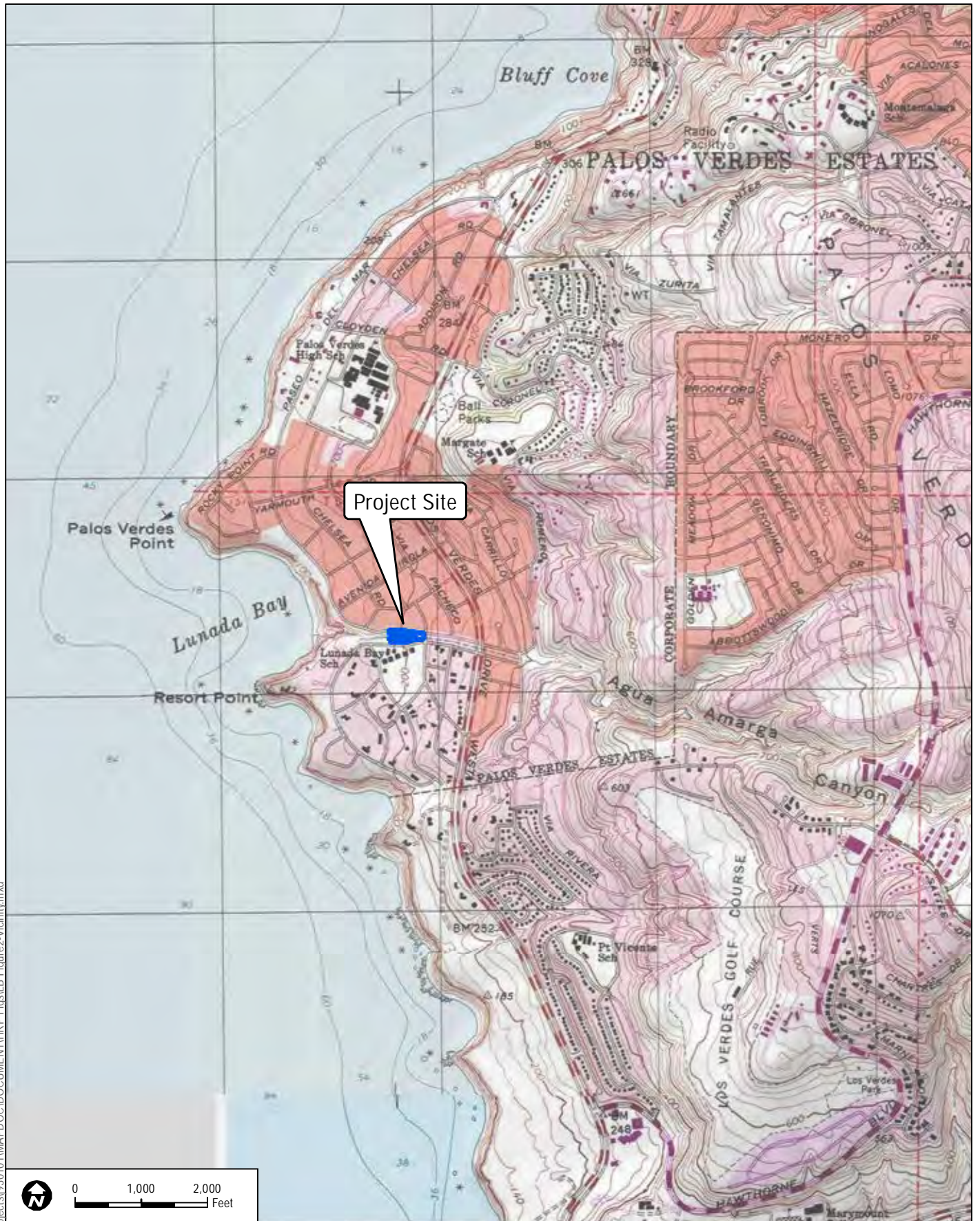
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Habitat Restoration Plan for Beautify Lunada Bay Project

FIGURE 1
Regional Map

Habitat Restoration Plan for the Lunada Bay Restoration Project

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SOURCE: USGS 7.5-Minute Redondo Beach, San Pedro Series Quadrangles.

FIGURE 2
Vicinity Map

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Habitat Restoration Plan for Beautiful Lunada Bay Project

Habitat Restoration Plan for the Beautify Lunada Bay Project

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2 EXISTING CONDITIONS

2.1 Site Description

The Lunada Bay Restoration Site is located on the western portion of the Palos Verdes Peninsula, in the City of Palos Verdes Estates. The Phase 1 area of the Lunada Bay Restoration Site is approximately 1.0 acre and averages an elevation of approximately 210 feet above mean sea level. The site is located just north of Lunada Bay Elementary School, north of Paseo Del Mar, west of Via Anacapa, and south of Paseo Lunado (Figures 1 and 2).

Vegetation within the Lunada Bay Restoration Site is composed principally of non-native annual grasses and forbs. Common non-native species that are likely to occur on site based on nearby disturbed plant communities include wild oat (*Avena fatua*, *A. barbata*), brome grasses (*Bromus diandrus*, *B. madritensis*, *B. hordeaceus*), tocalote (*Centaurea melitensis*), and black mustard (*Brassica nigra*) (PVPLC and CNPS 2010). Annual vegetation management and dieback of these weedy non-native species currently leaves site looking barren and unsightly for much of the year.

2.2 Geology and Soils

The Palos Verdes Peninsula is primarily an ancient marine terrace with relatively steep eroded canyons which drain southwesterly into the Pacific Ocean. The underlying geologic material consists of marine sedimentary and basaltic rocks. The area is seismically active, with active Palos Verdes and San Pedro fault zones that have caused the peninsula to uplift relative to the adjacent Los Angeles Basin and the offshore bedrock.

According to the Report and General Soil Map for Los Angeles County (USDA 1969), the soils within the Lunada Bay Restoration Site are composed of the Altamont-Diablo association (30–50% slopes). Soils of the Altamont-Diablo association occur on gently sloping to rolling foothills throughout the Los Angeles basin as far north as Point Dume. The Altamont-Diablo association is comprised of approximately 60% Altamont soils and 30% Diablo soils. Diablo soils are described to be 22–52 inches deep, are well drained, and have slow subsoil permeability. Altamont soils are described to be 24–36 inches deep, are well drained, and have slow subsoil permeability. They have dark brown, neutral, clay surface layers about 12 inches thick underlain by a brown, calcareous clay subsoil.

The proposed restoration area is situated on a terrace above the coastal bluffs. A soil sample was collected from the proposed restoration area. The soil sample was composed of 3 subsamples consisting of the 12-16-inch deep soil profile from each location to create a composite soil sample for analysis. The composite soil sample is representative of the general soil conditions on site within the rooting zone of the target plant species. The soil samples were submitted to Wallace Laboratories for analysis of standard soil constituents, agricultural suitability, texture,

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and cation exchange capacity. The results of the analysis show that, the soil is a gravely clay loam, with a slow/fair infiltration rate and fair/low organic matter (Appendix A). The soils report notes a high gravel content (up to 30% by volume) at this site, which appears to be the natural condition. The soil is slightly alkaline (pH = 7.75) and the salinity is moderate (ECe = 0.91 millimho/cm). Major nutrients (nitrogen and phosphorus) are moderate, and iron is deficient.

Plant establishment is not expected to be significantly inhibited due to the soil chemistry observed on site. The soils appear to be suitable for the establishment of the target vegetation community without major soil remediation or extensive soil amendments. However, backfill soil used during container planting should be amended with organic matter, as well as gypsum to enhance the establishment of container plants. Additionally, container plants are likely to struggle to become established without supplemental watering. While the soils on site pose no significant problems to establishment of native and drought tolerant habitat, as native soils they have low levels of major nutrients. Native species are adapted to lower nutrient soils, but will benefit from some supplemental nutrient augmentation during planting to initiate establishment (e.g., slow-release fertilizer packet).

2.3 Non-Native Invasive Species

Non-native species are abundant within the area identified for restoration, making up the majority of the existing vegetative cover. There is one large non-native Spanish daggers plant (*Yucca gloriosa*) that occurs within the area proposed for restoration that can remain as a component of the habitat because it is not considered to be invasive. Other non-native species should be controlled to allow establishment of the native plants. Controlling non-native species during the plant establishment phase will present a continual maintenance need, and should be prioritized as one of the most critical aspects of the restoration program. Non-native grasses and annual herbs, as well as additional non-native species observed in the area or with high potential to occur on site, are provided in Table 1 with their associated rating in the California Invasive Plant Council’s (Cal-IPC) Inventory of Invasive Plant Species (2015).

**Table 1
Non-Native Plant Species and Associated Cal-IPC Ratings**

High
<i>Bromus madritensis</i> ssp. <i>madritensis</i> —compact brome
<i>Carpobrotus edulis</i> —hottentot fig
<i>Foeniculum vulgare</i> —fennel
Moderate
<i>Atriplex semibaccata</i> —Australian saltbush
<i>Avena barbata</i> —slender oat
<i>Brassica nigra</i> – black mustard

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Table 1
Non-Native Plant Species and Associated Cal-IPC Ratings

Moderate
<i>Bromus diandrus</i> —ripgut brome
<i>Centaurea melitensis</i> —Maltese star-thistle
<i>Glebionis coronaria</i> —crowndaisy
<i>Hordeum murinum</i> —mouse barley
<i>Mesembryanthemum crystallinum</i> —common iceplant
<i>Pennisetum setaceum</i> —crimson fountaingrass
<i>Euphorbia terracina</i> —Geraldton carnation weed
Limited
<i>Bromus hordeaceus</i> —soft brome
<i>Erodium cicutarium</i> —redstem stork's bill
<i>Marrubium vulgare</i> —horehound
<i>Ricinus communis</i> —castorbean
<i>Salsola tragus</i> —prickly Russian thistle
None
* <i>Acacia cyclops</i> —coastal wattle
<i>Erigeron bonariensis</i> - asthmaweed
<i>Lactuca serriola</i> - prickly-lettuce
<i>Malva parviflora</i> —cheeseweed mallow
* <i>Melilotus indicus</i> —annual yellow sweetclover
<i>Solanum elaeagnifolium</i> - silverleaf nightshade
<i>Sonchus oleraceus</i> —common sowthistle
* <i>Tropaeolum majus</i> —nasturtium

* Note that while there are several species on the list that do not have a Cal-IPC rating for the state of California, that some of these species can be locally invasive. Species with an asterisk are considered to be moderately invasive within the region and should be aggressively controlled.

2.4 Additional Considerations

Given the location of the Lunada Bay Restoration Site, within a heavily urbanized area, there are a number of human use related considerations for this HRP. The northern segment of the restoration site, along Paseo Lunado, contains an unofficial pedestrian trail, with a visible pathway showing on the ground. This use by the community must be taken into account during the implementation of the restoration project, especially because Paseo Lunado lacks sidewalk infrastructure. Retaining this community, and even integrating a planned trail within the proposed restoration site, is a goal of this restoration plan.

Additionally, Paseo Lunado lacks roadside curbs in the northwestern section of the restoration site, which has allowed parking on the roadside shoulder. Roadside boulders are currently used to limit parking on the shoulder of Paseo Lunado to the west of the project site, but are not

Habitat Restoration Plan for the Lunada Bay Restoration Project

present along the restoration site boundary. Further analysis and communication with the City should be conducted to provide information on their preferred strategy to manage parking, as well as necessary regulatory brush setbacks from the road side. A peeler log fence, split rail fence, or post and cable fence could be considered to delineate the allowable parking areas from the restoration site. The City should also consider fuel modification zones in relation to residential areas and Lunada Bay Elementary, and the native species allowed within these zones by the local fire department. If required by the fire department, the planting pallet may need to be modified to comply with the fire department's regulations.

Views of the Pacific Ocean are important to homeowners along Paseo Lunado and Paseo del Mar. Plants selected for restoration of the Lunada Canyon Restoration Project will be selected to minimize the view impact. Additionally, given the proximity of the project site to the Lunada Bay Elementary School, the variety and placement of plants will be chosen to provide educational opportunities for students. Overall, the plant palette is designed with emphasis on diversity of species, year-round plant growth and flowering, aesthetics and viewsheds.

Habitat Restoration Plan for the Beautify Lunada Bay Project

3 RESTORATION PROGRAM

This HRP outlines the implementation strategy for habitat restoration at the Lunada Bay Restoration Site. This plan uses a restoration approach that emphasizes the recovery of the degraded ecosystem through planting to enhance biological functions and services as well as improve aesthetics for the local community while minimizing the view impacts over the long term. The targeted plant community is coastal sage scrub, which would have been historically present prior to development and site disturbance. The habitat restoration program consists of site preparation (primarily non-native plant species removal), native and drought tolerant planting, supplemental watering, and maintenance and monitoring.

3.1 Restoration Site Goals and Objectives

The disturbed habitat existing in the proposed restoration area limits potential wildlife use and reduces the ecological value of the area to the local community. Planting of native and drought tolerant habitat will provide increased wildlife habitat and a natural community amenity. In particular, the overarching goal of the restoration program is to rejuvenate this disturbed land and provide the local community with a more attractive open space alternative.

In addition to these broad goals, the following site-specific objectives for the Lunada Bay Restoration Site have been incorporated into this plan in the interest of minimizing adverse impacts to biological resources:

- Protect and enhance public use of the land parcel, as possible, and promote environmental awareness and appreciation within the community;
- Control non-native invasive weed species considered to be highly or moderately invasive on the Cal-IPC Invasive Plant Inventory (2015), and others identified by PVPLC as locally invasive (PVPLC 2013);
- Utilize erosion control measures in the form of “Best Management Practices” (BMPs) on the site as conditions necessitate;

3.2 Coastal Sage Scrub Establishment

Coastal sage scrub is composed of low, subshrubs approximately 1 meter (3 feet) high when mature, many of which are drought tolerant. Dominant shrub type varies across this vegetation type, depending on localized factors and levels of disturbance, but often includes California Sagebrush (*Artemisia californica*) and California Brittlebush (*Encelia californica*). In this community the shrub layer primarily forms a continuous canopy, but a more well-developed understory exists where spacing between shrubs is greater.

Habitat Restoration Plan for the Beautify Lunada Bay Project

The restoration strategy for coastal sage scrub habitat on the Lunada Bay Restoration Site includes reintroducing regionally appropriate and attractive native coastal sage scrub species. The plant palette (Table 2) has been designed to replicate the native composition of a healthy coastal sage scrub community similar to existing coastal sage scrub habitat present on the Palos Verdes Peninsula. It is expected that all planting will mimic the natural distribution and vegetation mosaic of natural habitat. On the Palos Verdes Peninsula, the primary coastal sage scrub dominants include California sagebrush, California brittlebush, and coastal buckwheat, with coast goldenbush, common deerweed, lemonadeberry, California buckwheat, sages, bladderpod, coast prickly-pear, and wishbone bush as common constituents. Given the community's desire that the restored area maintain attractive year-round, preference will be to restore species that remain colorful.

3.3 Revegetation Materials

Plant materials for the restoration planting area will include container stock of coastal sage scrub species, as indicated in the plant palette provided in Table 2 and described in Appendix B. As much as feasible, the container plant materials will be grown from native seed collected on the Palos Verdes Peninsula. The plant nursery should grow the plants primarily in D40 Deepots, with some smaller and larger sizes depending on the species (as indicated in Tables 2). If some species cannot be grown as container stock at the nursery, or local seed is not available for collection, the planting palettes may be adjusted, or another source may be used for acquiring locally sourced plant materials.

A seed mix is not proposed for this site. Considering that the site is within an urbanized area, and that the City intends to utilize community volunteers in the planting and maintenance, the approach to restoration includes installation of container plants and spreading of a thick layer of wood or bark mulch between shrubs to suppress weeds. This will significantly reduce the maintenance needs of the site, and will allow for an immediately attractive planted appearance.

3.4 Time Lapse

The length of time necessary for plants to become established depends on a variety of factors including weather, soil conditions, herbivory protection, weed competition, and maintenance quality. Under optimal conditions, coastal sage scrub species may take approximately three years from the installation of container plants to become adequately established to not require any supplemental watering or herbivory protection. In an unirrigated setting, and with drought conditions, scrub development may take longer than three years to mature enough to be sustainable. As a hedge against drought, the addition of supplemental watering will increase plant survival, improve establishment, and hasten habitat development.

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**Table 2
Proposed Coastal Sage Scrub Planting Palette (Approximately 1.0 Acre)**

Botanical Name	Common Name	Container Size	Spacing (on center)	Group Size	Quantity (per acre)	Planting Notes
<i>Acmispon glaber</i>	Common deerweed	D40	4	3	136	Plant at least 5 feet from edge of trail or road
<i>Artemisia californica</i>	California sagebrush	D40	5	3	174	Plant at least 5 feet from edge of trail or road
<i>Baccharis pilularis</i>	Coyote brush	D40	5	3	35	Plant at least 5 feet from edge of trail or road
<i>Brickellia californica</i>	California bricklebrush	D40	5	3	87	Plant at least 5 feet from edge of trail or road
<i>Corethrogyne filaginifolia</i>	Common sandaster	D40	3	3	24	Plant near edge of trail
<i>Cylindropuntia prolifera</i>	Coastal cholla	1-gallon	4	3	27	Plant at least 10 feet from edge of road or trail
<i>Dudleya virens</i>	bright green dydleya	D40	2	3	54	Plant near rocks or boulders
<i>Elymus condensatus</i>	Giant wildrye	D40	5	3	17	Plant along edge of drainage
<i>Encelia californica</i>	California brittlebush	D40	5	5	174	Plant at least 5 feet from edge of trail or road
<i>Epilobium canum</i>	California fuchsia	D40	2	5	109	Plant near edge of trail
<i>Eriogonum cinereum</i>	Coastal buckwheat	D40	5	5	174	Plant at least 5 feet from edge of trail or road
<i>Eriogonum fasciculatum</i>	California buckwheat	D40	5	5	87	Plant at least 5 feet from edge of trail or road
<i>Eriogonum parvifolium</i>	Seacliff buckwheat	D40	5	5	261	Plant at least 5 feet from edge of trail or road
<i>Eriophyllum confertifolium</i>	Golden yarrow	D40	3	5	145	Plant near edge of trail
<i>Eschscholzia californica</i>	California poppy	D40	2	3	109	Plant near edge of trail
<i>Galvesia speciosa</i> 'firecracker'	Island bush-snapdragon	D40	3	3	48	Plant near edge of trail
<i>Heteromeles arbutifolia</i>	Toyon	D40	6	1	12	Plant along edge of drainage
<i>Isocoma menziesii</i>	Coast goldenbush	D40	5	3	70	Plant at least 5 feet from edge of trail or road
<i>Mirabilis laevis</i> var. <i>crassifolia</i>	Wishbone bush	D40	4	5	82	Plant near edge of trail
<i>Opuntia littoralis/oricola</i>	Prickly-pear cactus	1-gallon	6	3	24	Plant at least 10 feet from edge of road or trail
<i>Penstemon spectabilis</i>	Showy penstemon	D40	3	3	48	Plant near edge of trail
<i>Peritoma arborea</i>	Bladderpod	D40	5	3	35	Plant at least 5 feet from edge of trail or road
<i>Rhus integrifolia</i>	Lemonadeberry	D40	15	1	6	Plant at least 15 feet from edge of road or trail
<i>Salvia leucophylla</i>	Purple sage	D40	5	3	87	Plant at least 5 feet from edge of trail or road
<i>Salvia mellifera</i>	Black sage	D40	5	3	87	Plant at least 5 feet from edge of trail or road
<i>Sambucus nigra</i>	Blue elderberry	1-gallon	10	1	4	Plant along edge of drainage
<i>Sisyrinchium bellum</i>	Blue-eyed grass	D40	2	3	218	Plant near edge of trail
Total					2,337	

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Habitat Restoration Plan for the Beautify Lunada Bay Project

4 IMPLEMENTATION PLAN

4.1 Rationale for Expecting Success

This HRP includes a provision for supplemental watering to promote establishment and survival of native species included in the plant palette. Additionally, native plant materials will be grown or collected from sources on the Palos Verdes Peninsula, thus preserving genetic integrity and increasing the potential for long-term success.

4.2 Preliminary Schedule

Appropriate timing of planting will minimize the need for supplemental watering and will increase the survival rate of the installed plants. The best survival rates are achieved when container plants are installed at the onset of the rainy season or soon thereafter (November through February). Planting and seeding at the site should be timed to take advantage of seasonal rainfall patterns and most appropriate growing season temperatures (see Charts 1–2 and Table 3).

Table 3
Preliminary Restoration Project Schedule

Task	Date
Site clearing	Fall prior to first year
Invasive weed species control and grow-kill cycles	Fall or winter of first year*
Installation of supplemental watering system	Fall or winter of first year
Planting container stock	Early Winter of first year
Maintenance and Monitoring Period	To begin upon installation of container plants

Note: A full growing season (fall through spring) of grow-kill cycles is recommended if the project schedule can accommodate it.

Habitat Restoration Plan for the Beautify Lunada Bay Project

Chart 1
Average Monthly Precipitation for the Palos Verdes Peninsula

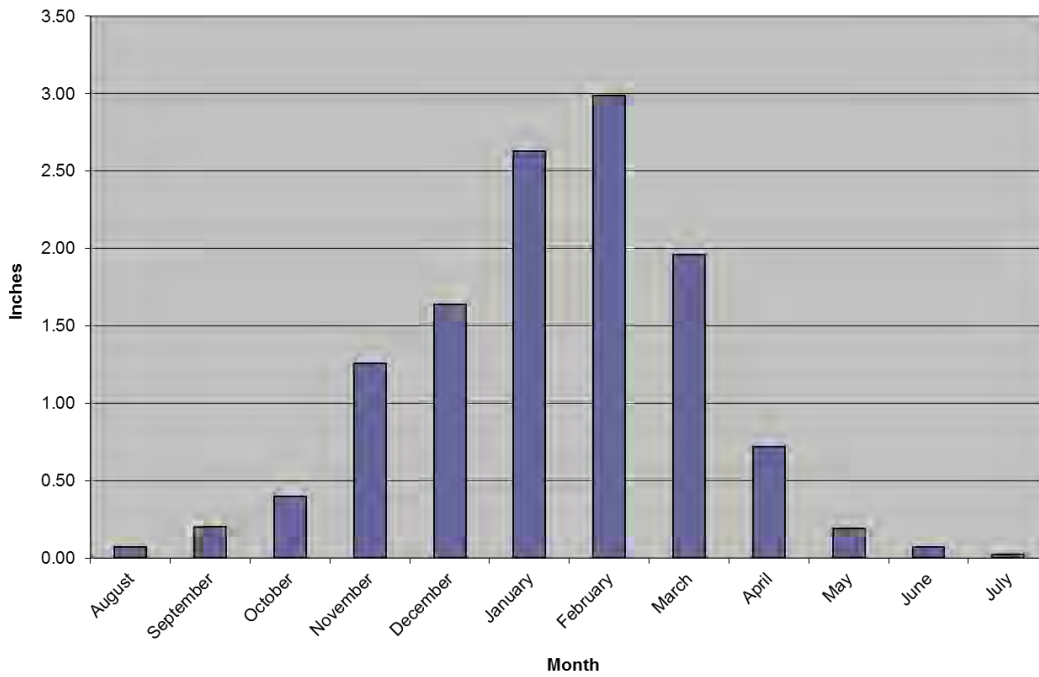
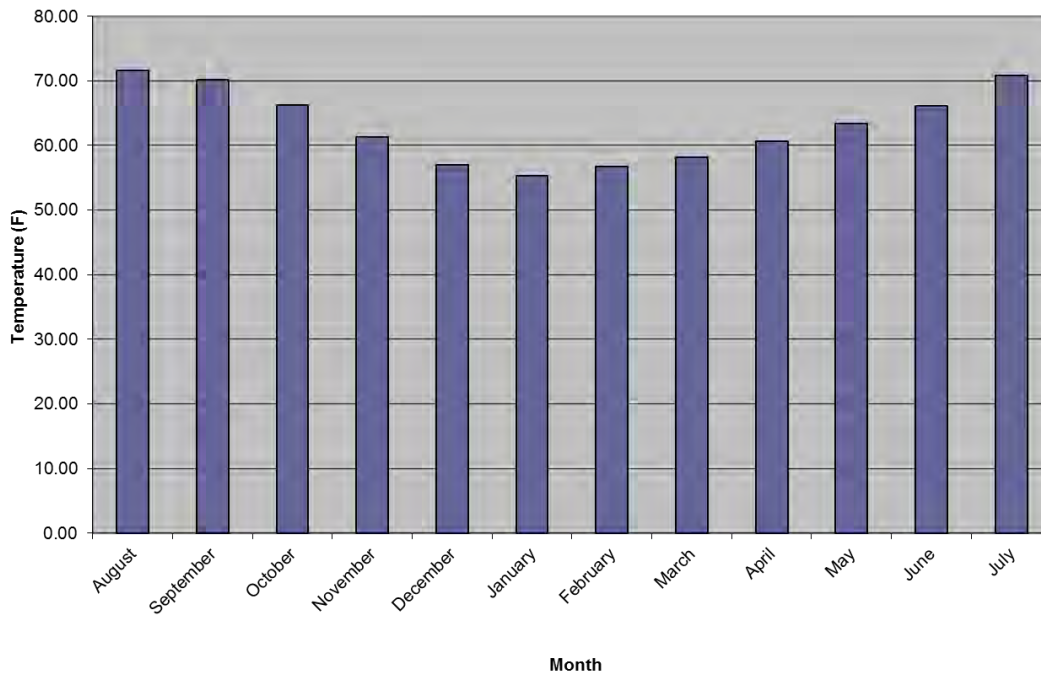


Chart 2
Average Monthly Temperatures for the the Palos Verdes Peninsula



Habitat Restoration Plan for the Beautify Lunada Bay Project

4.2.1 Site Preparation

During site preparation, all invasive weed species, particularly non-native annual grasses, black mustard, and fennel, should be killed and removed from the restoration areas. The initial weed control effort will involve a combination of chemical and mechanical treatment. Prior to the installation of native plant materials, “grow and kill” weed removal treatments should be conducted by allowing non-native seedling emergence in the winter. When weeds have begun to grow, and before they begin to develop flowers or flowering structures, a foliar application of an appropriate systemic herbicide should be applied to kill target weeds. If adequate rainfall occurs during this period, multiple grow-kill cycles should be repeated. Any use of herbicides shall be in accordance with label instructions, following the recommendations of a licensed Pest Control Advisor, and any application shall be applied under the direction of a state-certified Qualified Applicator.

4.2.2 Supplemental Watering System

Supplemental watering will be necessary to aid plant establishment. Supplemental watering should only be used until the plants are established such that they can survive on their own between periods of rainfall. Options for supplemental watering include installing an irrigation system (drip system is recommended), installing hose connections for hand watering with hoses, or hand-watering from trucked water.

If a temporary irrigation system is installed, it is expected that, depending upon the level of plant establishment, the irrigation system would be removed after two to three years of use. Watering on site will gradually be decreased prior to the removal of the system so the plants can become acclimated to the site’s natural conditions.

There is a fire hydrant located along the southern edge of the restoration site along Paseo Del Mar that may function as a point of connection for a temporary irrigation system or installation of a mainline for connecting hoses (Figure 3). Another fire hydrant exists near the northeast of the project site, on the corner of Paseo Lunado and Via Anacapa, however it is positioned across the street from the restoration site. If an irrigation system is planned, it should be designed by a landscape architect to ensure that the system has adequate water pressure to supply water to all areas of the proposed restoration site. The supplemental watering system would be installed as an above-ground system, so that irrigation equipment may be removed once the system has been decommissioned.

4.2.3 Erosion Control

The site is primarily flat, and erosion issues are not anticipated. However, where needed, erosion control measures, such as the installation of sandbags, fiber rolls, silt fencing, and/or erosion-

Habitat Restoration Plan for the Beautify Lunada Bay Project

control matting may be necessary to control erosion until target vegetation is established. Erosion control materials may be needed at the edge of the channel in the center of the restoration site, particularly in the locations where surface runoff coalesces and runs off the terrace. No erosion control materials should be used that contain seed from non-native plants. The necessity and location of erosion control will be determined in the field by City staff or staff from the PVPLC, as needed.

4.2.4 Plant Installation

Standard planting procedures will be employed for installing container stock (see Figure 4). An experienced restoration ecologist should be on site to manage and oversee planting done by volunteer groups. Planting holes shall be approximately twice the width of the rootball, and as deep. If dry soil conditions exist at the time of plant installation, planting holes will be filled with water and allowed to drain immediately prior to planting. A fertilizer packet with controlled-release fertilizer (e.g., Best Paks 20-10-5) will be placed in the bottom of each hole prior to planting. The plant will then be gently removed from the container and placed in the hole. Soil removed during the digging of the hole will be amended with gypsum and organic matter and returned to the hole as backfill. Plants should then be “watered in,” receiving a good soaking of water, which will infiltrate to the full depth of the plant roots.

4.2.5 Mulch Application

Wood or bark mulch should be spread three to four inches thick around all plants and interstitial areas to limit weed growth, retain soil moisture, moderate soil temperature, and limit erosion.

4.2.6 Herbivory Protection

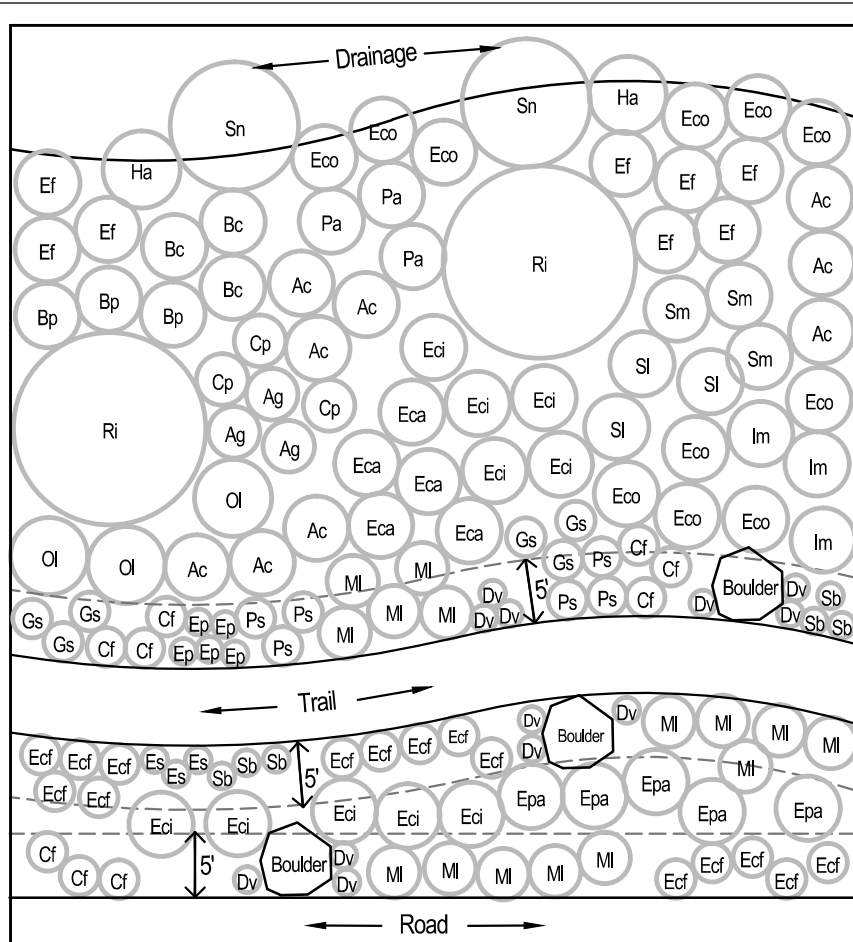
If plant herbivory (e.g., from rabbits, gophers, etc.) becomes problematic, herbivory protection may be temporarily needed to aid plant establishment. Plant protective cages (poultry netting or hardware cloth) can be used to establish protective cages for plants most susceptible to herbivory. The plant cages are a temporary feature and can be removed when the plants are large enough to withstand some herbivory pressure without causing mortality.



Lunada Bay Restoration Project Site
● Existing Fire Hydrant
 0 50 100 Feet

FIGURE 3
Project Site

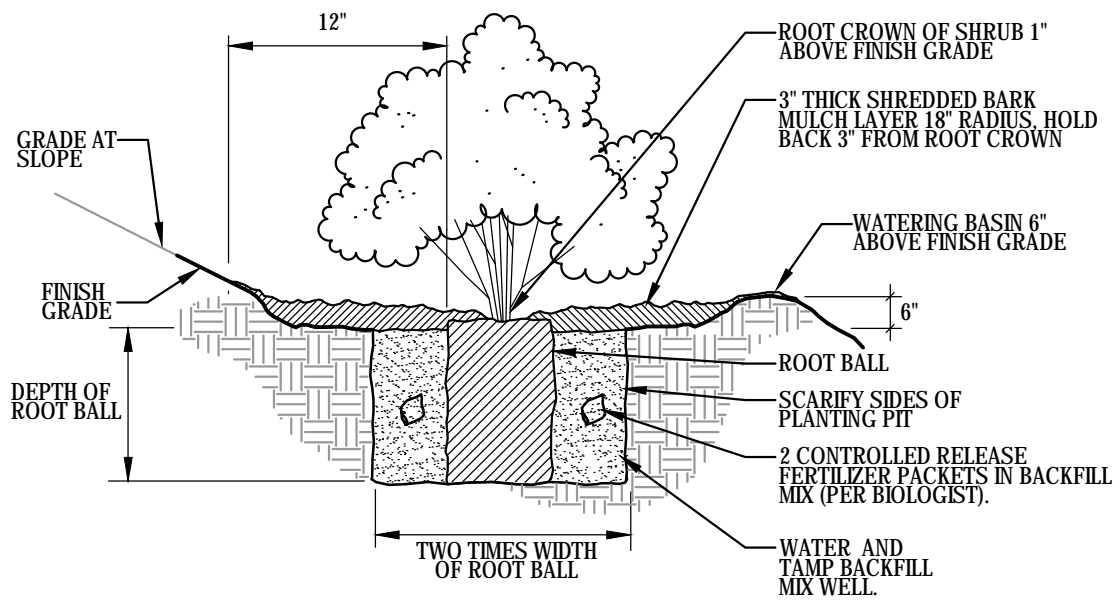
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SYMBOL	SPECIES	SPACING (On Center)	GROUP (Number)
Ag	<i>Acmispon glaber</i>	4'	3
Ac	<i>Artemisia californica</i>	5'	3
Bp	<i>Baccharis pilularis</i>	5'	3
Bc	<i>Brickellia californica</i>	5'	3
Cf	<i>Corethrogyne flaginifolia</i>	3'	3
Cp	<i>Cylindropuntia prolifera</i>	4'	3
Dv	<i>Dudleya vires</i>	2'	3
Eco	<i>Elymus condensatus</i>	5'	3
Eca	<i>Encelia californica</i>	5'	5
Eci	<i>Eriogonum cinereum</i>	5'	5
Ef	<i>Eriogonum fasciculatum</i>	5'	5
Epa	<i>Eriogonum parvifolium</i>	5'	5
Ep	<i>Epilobium canum</i>	2'	5
Ecf	<i>Eriophyllum confertifolium</i>	3'	5
Es	<i>Eschscholzia californica</i>	2'	3
Ga	<i>Galvesia speciosa 'firecracker'</i>	3'	3
Ha	<i>Heteromeles arbutifolia</i>	6'	1
Im	<i>Isocoma menziesii</i>	5'	3
MI	<i>Mirabilis laevis var. crassifolia</i>	4'	5
Ol	<i>Opuntia littoralis/oricola</i>	6'	3
Pa	<i>Peritoma arborea</i>	5'	3
Ps	<i>Penstemon spectabilisq</i>	3'	3
Ri	<i>Rhus integrifolia</i>	15'	1
Sl	<i>Salvia leucophylla</i>	5'	3
Sm	<i>Salvia mellifera</i>	5'	3
Sn	<i>Sambucus nigra</i>	10'	1
Sb	<i>Sisyrinchium bellum</i>	2'	3

TYPICAL PLANTING LAYOUT
PLAN VIEW

NO SCALE



CONTAINER PLANTING DETAIL
SECTION VIEW

NO SCALE

P:\300 Environmental\4979-01 RPV Conservancy\PV Estates - Lunada Bay\Document\Figures\Native Plant\Fig-4 ConceptPlantingDetail



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Habitat Restoration Plan for the Lunada Bay Restoration Project

FIGURE 4
Conceptual Planting Plan

Habitat Restoration Plan for the Beautify Lunada Bay Project

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Habitat Restoration Plan for the Beautify Lunada Bay Project

5 ADAPTIVE MANAGEMENT PLAN

The purpose of the adaptive management plan is to provide guidelines for long-term maintenance and monitoring of the restoration site during the establishment period (3-5 years). Because the goal of this project is to establish a natural system that can support itself with little or no maintenance, the primary focus of the adaptive management plan is concentrated in the first few seasons of plant growth following the revegetation effort, when plants are becoming established. The intensity of the maintenance activity is expected to subside each year as the native plants become established, and local competition from non-native plants for resources is minimized through direct removal and treatment of non-native plants.

5.1 Maintenance Activities

Maintenance activities will be primarily related to non-native invasive plant species control. Supplemental watering, supplemental planting, trash removal, and erosion control will also be conducted, as necessary.

- Non-native plant species should be controlled as soon as they begin to establish. Recommended control methods should be tailored to each specific weed species and should include the most effective control measures for the species and time of year. Control methods may include a combination of manual, mechanical, and chemical control.
- Container plants should be watered when natural rainfall is not adequate to sustain the establishing plants. A restoration ecologist should be responsible for scheduling the supplemental watering to promote plant establishment. Supplemental watering should be conducted as deep, soaking watering to promote deep rooting.
- Erosion control materials should be maintained in working order until they are deemed no longer necessary by the project's restoration ecologist. Maintenance of erosion control materials may include repairing or replacing dilapidated, damaged, or ineffective materials.

5.2 General Habitat Management Guidelines

5.2.1 Weed Control

Weeds are expected to be the primary pest problem in the restoration area during the first several years of the management period. Weeds should be controlled so they do not prevent the establishment of native species. A combination of physical removal, mechanical treatments (weed whipping), and appropriate herbicide treatments may be used to control non-native/invasive plant species. Weeds should be controlled prior to setting seed, and should be removed from the site if they become large enough to block sunlight to developing

Habitat Restoration Plan for the Beautify Lunada Bay Project

native plants. Because this restoration plan will be implemented largely through volunteer effort, removing all annual plants from the site during weeding visits will simplify maintenance. The heritage of the site suggests that the majority of annual species will be non-native, and maximizing the efficiency of volunteer efforts is a priority of this plan.

Re-establishment of non-native plants onto the site can be adequately minimized by regular and timely maintenance visits with implementation of effective weed control measures. Weed control will require constant diligence by the City. Invasive plant species, such as those listed in Table 1 should be controlled wherever possible within the restoration area.

Removal of weeds by hand where practicable and effective is the most desirable method of control and should be done around individual plantings to avoid inadvertent damage to the native species. However, several of the invasive species may be more effectively controlled with herbicide due to their tenacious and spreading root systems, their size, or their ability to re-sprout from root fragments. All herbicides shall be used in accordance with label instructions, following the recommendations of a licensed Pest Control Advisor, and any application shall be applied under the direction of a state-certified Qualified Applicator. The project's restoration ecologist should monitor control efforts to ensure that the target weed species are being adequately addressed without impacting the native plants.

5.2.2 Supplemental Watering System

Supplemental watering should be provided for two to three years after planting to help the container plants become established. During the rainy season, supplemental watering will be scheduled based upon rainfall and soil moisture, but is expected to be needed 2-3 times per month. During summer months of the first year, supplemental watering will likely be necessary every week during the dry season.

If an irrigation system is installed, the system should be checked regularly to ensure proper operation and adequate coverage of the restoration areas. Problems with the watering system should be repaired immediately to reduce potential plant mortality, erosion, or wasted water. The frequency and duration of irrigation applications shall be adjusted seasonally in coordination with the project's restoration ecologist to meet habitat needs.

Supplemental watering will be terminated when deemed appropriate by the project's restoration ecologist. All above-ground components of the watering system should be removed from the site at the successful completion of the project.

Habitat Restoration Plan for the Beautify Lunada Bay Project

5.2.3 Clearing and Trash Removal

Trash consists of all man-made materials, equipment, or debris dumped, thrown, washed into, or left within the restoration area. Pruning or clearing of native vegetation may occur within the restoration area in the future if extensive growth is causing a maintenance problem for road or pedestrian path usage. Any pruning or clearing of native vegetation should be approved by the project's restoration ecologist. Deadwood and leaf litter of native vegetation will be left in place to replenish soil nutrients and organic matter.

5.3 Adaptive Management Inspections

A restoration ecologist should perform periodic inspections of the restoration site following the installation of container plants to determine the status and health of plants. Recommendations for maintenance efforts and supplemental watering will be based upon these site visits. Weed control should be conducted as needed to ensure adequate control to promote healthy establishment of the container plants. It is anticipated that weed control will be necessary on a monthly basis during the winter and early spring when weeds are vigorously growing. Weed control during other times of the year will likely be diminished, but conducted as necessary and identified by the project's restoration ecologist. The restoration ecologist should determine necessary remedial actions and ensure that appropriate maintenance occurs in a timely manner. The restoration ecologist may also assist the City with volunteer work crews during preparation of the restoration area including site clearing and soil preparation, weed control, container plant installation, supplemental watering, and periodic maintenance visits.

Habitat Restoration Plan for the Beautify Lunada Bay Project

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6 PROJECT CONCLUSION

The Lunada Bay Restoration Project will be considered complete upon successful establishment and persistence of native coastal sage scrub within the restoration area. It is expected that this can be accomplished within 3–5 years of installation of container plants depending on environmental factors (rainfall, disease, weed competition, etc.). Upon completion, the site will be managed by the City of Palos Verdes Estates.

Habitat Restoration Plan for the Beautify Lunada Bay Project

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Habitat Restoration Plan for the Beautify Lunada Bay Project

7 REFERENCES

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- Palos Verdes Peninsula Land Conservancy. 2013. Cumulative Report for the Targeted Exotic Removal Program for Plants (TERPP). Prepared by the Palos Verdes Peninsula Land Conservancy. August.
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Habitat Restoration Plan for the Beautify Lunada Bay Project

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APPENDIX A

Soil Test Results

WALLACE LABS
365 Coral Circle
El Segundo, CA 90245
(310) 615-0116

SOILS REPORT

Print Date Nov. 5, 2015

Receive Date 11/4/15

Location Lunada Bay
 Requester Adrienne Mohan, Palos Verdes Peninsula Land Conservancy
 graphic interpretation: * very low, ** low, *** moderate

ammonium bicarbonate/DTPA

**** high, ***** very high

extractable - mg/kg soil
 Interpretation of data
 low medium high
 0 - 7 8-15 over 15
 0-60 60 -120 121-180
 0 - 4 4 - 10 over 10
 0- 0.5 0.6- 1 over 1
 0 - 1 1 - 1.5 over 1.5
 0- 0.2 0.3- 0.5 over 0.5
 0- 0.2 0.2- 0.5 over 1

Sample ID Number 15-309-05
 Sample Description Soil Sample Received 11/04/2015

elements

phosphorus
 potassium
 iron
 manganese
 zinc
 copper
 boron

graphic
 11.43 ***
 421.89 *****
 1.04 *
 2.72 ****
 5.40 ****
 8.44 *****
 0.11 **

calcium
 magnesium
 sodium
 sulfur
 molybdenum
 nickel

318.16 ***
 525.04 *****
 175.04 ***
 15.95 *
 0.12 ****
 2.49 **

The following trace elements may be toxic
 The degree of toxicity depends upon the pH of the soil, soil texture, organic matter, and the concentrations of the individual elements as well as to their interactions.

aluminum
 arsenic
 barium
 cadmium
 chromium
 cobalt
 lead
 lithium
 mercury
 selenium
 silver
 strontium
 tin
 vanadium

n d *
 0.08 *
 1.75 *
 1.29 **
 n d *
 0.06 *
 3.29 **
 0.26 *
 n d *
 n d *
 0.84 *
 n d *
 4.50 *****

The pH optimum depends upon soil organic matter and clay content- for clay and loam soils: under 5.2 is too acidic
 6.5 to 7 is ideal
 over 9 is too alkaline

Saturation Extract

pH value

7.75 ****

The ECe is a measure of the soil salinity:
 1-2 affects a few plants
 2-4 affects some plants,
 > 4 affects many plants.

ECe (milli-mho/cm)

0.91 ***
 millieq/l

calcium
 magnesium
 sodium
 potassium
 cation sum

71.6 3.6
 26.8 2.2
 52.9 2.3
 10.4 0.3
 8.4

problems over 150 ppm
 toxic over 800

chloride
 nitrate as N
 phosphorus as P
 sulfate as S
 anion sum

126 3.6
 34 2.4
 0.5 0.0
 11.4 0.7
 6.7

toxic over 1 for many plants
 increasing problems start at 3

boron as B

0.11 *

SAR

1.4 *

est. gypsum requirement-lbs./per 1,000 square feet

3

relative infiltration rate
 soil texture
 sand
 silt
 clay
 lime (calcium carbonate)
 organic matter based on carbon
 moisture content of soil
 half saturation percentage

slow/fair
 gravelly clay loam gravel > 2 mm
 31.7% 35.4%
 31.6% gravel > 1/4 inch
 36.7% 20.9%
 yes gravel > 1/2 inch
 fair/low 11.9%
 10.1%
 34.5%

Elements are expressed as mg/kg dry soil or mg/l for saturation extract.
 pH and ECe are measured in a saturation paste extract. nd means not detected.
 Analytical data determined on soil fraction passing a 2 mm sieve.

APPENDIX B
Plant Profiles



BEAUTIFY LUNADA BAY PLANT PROFILES





DEERWEED

Scientific name: *Lotus scoparius*
Plant family: Fabaceae

Natural Information

Common deerweed, or California broom, is a perennial that flowers throughout most of the year on desert slopes, chaparral, and in open areas at elevations below 4950'. Full sunlight and dry humidity are favored by this relatively abundant plant.

Physical Description

- Leaves: oval; sets of threes; 1/2"- 3/4" long
- Flowers: clustered in whirls along branch; 1/2"-3/4" long; yellow to orange; peak-like
- Branches: appear as mat
- Stem: thin; stiff; dark-green

Garden Tips/Extra Facts:

Grows up to 2' tall as a shrub. It is a pioneer species in nature and helps to fertilize the soil naturally. Very useful in restoration or if starting with a bare garden; it will help establish a plant community.



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CALIFORNIA SAGE BRUSH

Scientific name: *Artemisia californica*

Plant family: Asteraceae

Natural Information

California sage brush flowers in the fall, on slopes and coastal sage scrub. Mostly found at elevations below 2000', plants usually grow in sand, sandy loam, clay, gravelly loam, and unconsolidated soils. As a dominant species, this plant requires full sun and light shade. Providing favored nesting sites for black tailed gnatcatchers, *Artemisia californica* is ecologically vital as a keystone species.

Physical Description

- Branches: lower branches woody; do not exceed 1/4" in diameter; side shoots form from leaf axils
- Flower: inconspicuous inflorescence; forms a dense panicle
- Leaves: thin; small ones appear wilted during dry season but become hydrated again within hours of rainfall
- Roots: shallow
- Stem: woolly; multiple stems arise from root crown

Garden Tips/Extra Facts:

Fragrant due to the presence of terpenes, the aroma is released when brushed against. During the first post-disturbance growing season, the plant's steady germination often prevents the development of an adequate seed bank for recruiting large numbers of seedlings. Seeds buried near the surface of moist soil generally germinate without any other special conditions. Those buried below the level of light penetration required exposure to charred wood leachate before germinating. In the wild, germination rate is moderate to high in fire-free seasons. The shrubs are also capable of growing from roots if basal portions of the stem remain attached. Stem growth most frequently occurs during the winter. Can grow from 2' to 5' tall.



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COYOTE BRUSH

Scientific name: *Baccharis pilularis*
Plant family: Asteraceae

Natural Information

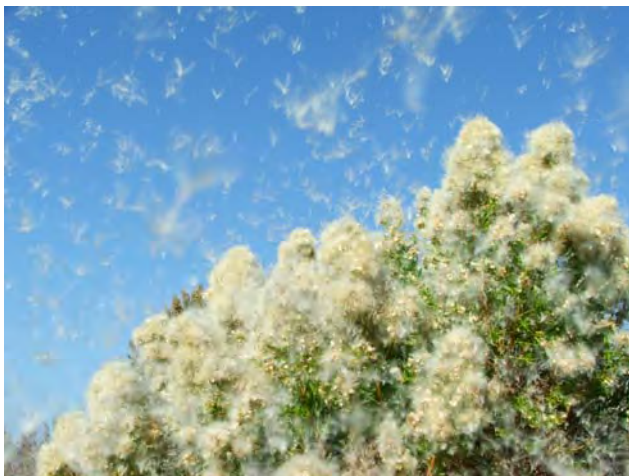
Coyote brush is relatively common on hillsides and canyons at elevations below 2500'. Occasionally mixed in dominance with other plants, it is insect pollinated and requires full sunlight and poor, well-drained soils. This plant tolerates maritime exposure and flowers between September and December.

Physical Description

- Bud: 1/4"
- Flower: white pappus hairs when seeding; white fluffy flowers on female plants; creamy-yellow disk male flowers
- Leaves: 3/4"-1"; small toothed; bright green at flowering season; generally dull, leathery-green
- Stem: grooved

Garden Tips/Extra Facts:

The plant is good for stabilizing dunes, and its infusion is a general panacea. The leaves are fragrant and resinous. Growth rate is fast for a native shrub. The shrub can serve as a firebreak. From 5' to 8' tall.



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BRICKELLBUSH

Scientific name: *Brickellia californica*
Plant family: Asteraceae

Natural Information

Brickellbush flowers and seeds between midsummer and fall, in well-drained clay soils. Pollinated by moths, it is relatively common in damp humid, sunny environments.

Physical Description

- Flowers: $\frac{1}{4}$ " – $\frac{1}{2}$ "; inconspicuous; open blooms; striated bracts; branched/tubular shape; leafy inflorescence at base of leaves; silvery white pappus hair and green; appear white
- Leaves: $\frac{1}{2}$ " – 1" long; alternating, short petiole; broad; rounded; prominent vein on underside; equal width and length; green

Garden Tips/Extra Facts:

Grows 3' tall and 4' wide. The leaves are sweetly scented, and the plant exudes a perfume at night, similar to the scent of jasmine, to attract moths for pollination.



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CALIFORNIA ASTER

Scientific name: *Corethrogyne filaginifolia*
Plant family: Asteraceae

Natural Information

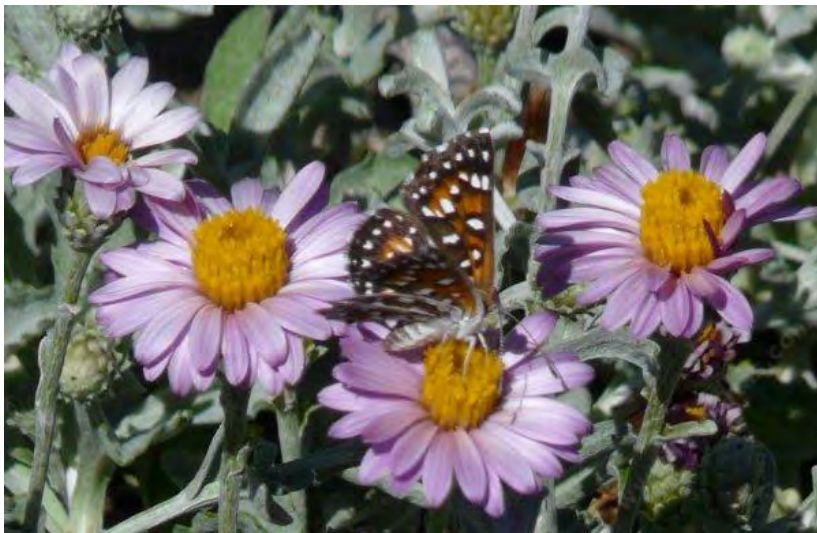
California aster flowers in summer and fall. This plant is very drought tolerant. Gabbs Checkerspot butterfly larvae utilizes this species for food and a host of butterflies from skippers to Swallowtails use the nectar. California aster occurs from coastal bluffs up into the upper elevations of the mountains of central and southern California.

Physical Description

- Flower: lavender with yellow center, 10-50 flowers per raceme
- Leaves: simple, gray-green, hairy

Garden Tips/Extra Facts:

Can grow to 1' to 2' tall, and 4' to 6' wide. This perennial will do well in full sun with well-drained soil and no summer water. Hardy perennial that may require dead-heading in the winter after flowering.



Las Palitas



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COASTAL CHOLLA

Scientific name: *Cylindropuntia prolifera*
Plant family: Cactaceae

Natural Information

Coastal cholla inhabits inland coastal scrub and ocean bluffs on southern slopes at elevations below 990'. Only found in specific areas thus somewhat rare, it is co-dominant among neighboring plants. Black-tailed gnatcatchers utilize the foliage for survival purposes. Its flowering time is between April and June.

Physical Description

- Branch: 1"-2" thick
- Flower: 1"-2"; dark, purple-red
- Spires: encased in sheath; red-brown
- Stem: 1"-2" trunk

Garden Tips/Extra Facts:

Can grow from 2' to 4' tall. Allow unblemished fruit to ripen; clean and dry seeds. Unblemished fruit must be significantly overripe before harvesting seed, and properly cleaned, seeds can be successfully stored. From softwood cuttings, allow cut surface to callous over before planting. The plant has its name because spires readily detach upon contact with anything. The spires have invisible barbs, making removal difficult.



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GREEN LIVEFOREVER

Scientific name: *Dudleya virens*

Plant family: Crassulaceae

Natural Information

Green liveforever flowers between April and June and seeds in the fall. This perennial inhabits rocks and canyons, steep slopes in chaparral, coastal bluffs, and coastal sage scrub and elevations below 1300'. Extremely common on coastal bluffs although rare otherwise, this plant is favored in damp conditions, and attracts many hummingbirds.

Physical Description

- Flower: star-shaped and spread open, thus distinguishable from *D. lanceolata*; fragrant; white
- Leaves: 3"-6"; 10" in wet year; rosette arrangement; succulent; bright green, but turn gray during drought seasons
- Seeds: stiff pods open upright
- Stem: fleshy and purplish

Garden Tips/Extra Facts:

Grows to 14" tall. The plant will turn gray during dry seasons in order to reflect light from its leaves. It should be watered around the base to avoid the rot that may result from water collection in its crown of leaves. Cactus mix is also helpful for this plant's growth. The plant's species name, *virens*, is Latin for its color, bright green. Its seeds are wind pollinated. It is pioneer species, capable of growing even in rock crevices.



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CALIFORNIA BUSH SUNFLOWER

Scientific name: *Encelia californica*
Plant family: Asteraceae

Natural Information

California bush sunflowers typically flower from February to August, and all year in moist areas. Abundant on hillsides and open or bushy slopes below elevations of 2000', it is co-dominant with other neighboring plants, especially in its early stages. Prefers dry humid conditions in the summertime.

Physical Description

- Flowers: 2" (blooming); rich yellow ray (outer) flowers; black center with disk flowers; mature disk flowers have yellow tops; yellow-brown at center
- Leaves: 1 ½"-3"
- Stems: hairy

Garden Tips/Extra Facts:

Can grow from 2' to 4' tall and to 3' wide. Beautiful cut flowers. Plant is short-lived and best if mixed with *Ceanothus* or *Salvias* for short-term fill-in with *Quercus* or *Rhus* planted for longer term.



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CALIFORNIA FUCHSIA

Scientific name: *Epilobium canum*
Plant family: Onagraceae

Natural Information

California fuchsia flowers from August to January on slopes and ridges at elevations below 9000'. This slightly woody perennial is abundant along open channels with well-drained soil, with full sun exposure and in dry conditions. It can invasively spread among other plants and attracts hummingbirds.

Physical Description

- Branches: brittle; soft hairs
- Flowers: 1" – 1 ½ " 4 long petals; funnel shape; 4 cleft sepal cup; 8 stamens and style; loosely clustered; red-orange (at first green)
- Leaves: lanceolate; narrow; alternate on main stem; gray

Garden Tips/Extra Facts:

Can grow from 16" to 24" tall. The plant is hardy with a rapid growth rate and little water requirements. The early Spanish applied a solution of it to cuts and bruises.



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ASHY LEAF BUCKWHEAT

Scientific name: *Eriogonum cinereum*
Plant family: Polygonaceae

Natural Information

Ashy leaf buckwheat is a perennial that flowers from April to winter, and seeds during the late fall season. Beaches, hillsides, and bluffs are common places to find this plant, at elevations below 1640', in dry conditions and in poor soil. Co-dominant among other plants, flowers attract butterflies and other nectar insects. It provides both food and habitat for the square-spotted blue butterfly.

Physical Description

- Flowers: clustered; found on 1"-2" branchlets; white, with red to pink stripes
- Leaf: 1'-1½"; wavy, undulating edges; oval; top is gray-green; white on bottom
- Stem: fine wool; gray-green

Garden Tips/Extra Facts:

Can grow from 2' to 4' tall, and up to 6' wide. The plant is dry, so it is a fire hazard in the summer.



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CALIFORNIA BUCKWHEAT

Scientific name: *Eriogonum fasciculatum*
Plant family: Polygonaceae

Natural Information

California buckwheat flowers from April to October on hillsides at elevations below 7545'. Dry humid conditions make this plant relatively common. It attracts bees and other pollinators.

Physical Description

- Branches: 1"-2" branchlets
- Flowers: 1/2"- 3/4"; white, pink to red stripe; reddish brown clusters after seeding (drying)
- Leaves: 1", rolled edges, dark top, white underside; form fascicles that are tightly bound around the stem; narrow; numerous; bundled around stems

Garden Tips/Extra Facts:

Grows from 2' to 4' tall, and 2' to 3' wide. This form of buckwheat is considerably more flexible, lower, more drought tolerant, and more floriferous than the straight species. Some opt to remove rose bushes to plant this one as it has more flowers for longer with less care and watering.



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DUNE BUCKWHEAT

Scientific name: *Eriogonum parvifolium*
Plant family: Polygonaceae

Natural Information

Dune buckwheat is endemic to California and somewhat of a rare annual shrub. Found on hillsides, dunes, and sea bluffs at elevations below 2000', partial to full sun exposure and dry conditions favor its growth. Flowers serve as a mating, nesting, and larval and adult nectar food source for the endangered El Segundo Blue butterflies and Smith's Blue butterflies (*Euphilotes enoptes smithi*). It flowers from June to fall.

Physical Description

- Flower: pinkish white
- Leaves: 1/4"- 3/4"; thick, glossy, green top; rolled edges; cotton-like white on underside; top surface becomes orange to red with age
- Stem: wooden; brittle; pinkish tan

Garden Tips/Extra Facts:

From 2' to 4' tall with a diameter of 20" to 80". The plant has fire-retardant properties and is a good ground cover. It has a high salt tolerance and low water requirements. The name *parvifolium* translates into "small-leaved," although this is a misnomer because the leaves of *E. parvifolium* are larger than those of *E. fasciculatum*.



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GOLDEN YARROW

Scientific name: *Eriophyllum confertiflorum*
Plant family: Asteraceae

Natural Information

Golden yarrow flowers from March to July and seeds during the summer. This perennial inhabits slopes and open places away from the coast, at elevations below 9800'. This plant is drought tolerant and extremely common in well-drained soils.

Physical Description

- Leaves: 3-5 lobed; hairy underneath; alternate; prominent veins; dark green
- Flowers: 1"-2" across; ray flowers are 1/4" long; disk flowers 1/8" long; formed from tightly clustered terminal buds; grooved petals; golden-yellow
- Stem: white, woolly when young

Garden Tips/Extra Facts:

Can grow from 1' to 2' tall and from 2' to 3' wide. Does best with full sun, a little summer water, good drainage, and is excellent with penstemons. Cut plant to within a few inches from the ground in the fall.



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CALIFORNIA POPPY

Scientific name: *Eschscholzia californica*
Plant family: Papaveraceae

Natural Information

California poppies flowers from February to September, in grassy open areas and dune habitats at elevations below 2000'. Relatively abundant and pollinated by birds and insects, this perennial (short-lived) herb grows with full sun exposure.

Physical Description

- Bud: 1"; cap covers petals
- Flowers: four 2" petals (smaller in late spring); satiny; numerous stamens and one pistil; bright orange (late-spring varieties may have yellow flowers)
- Leaves: dissected into narrow segments
- Pod: 3"–5"; contains many seeds; will split open to release them
- Root: Taproot
- Seed: 1.5 mm – 1.8mm wide, elliptical, ridged, brown to black

Garden Tips/Extra Facts:

From 1' to 2' tall, and 2' to 3' wide. The juice of the California Poppy was used by Indians to relieve toothache pains. It has been found to be toxic on occasion. It is the official flower of California. The petals fold in the evening. When mature, the seed vessel opens with a pop and throws the seed some distance. The Spanish Californians made a hair dressing by frying the flowers in olive oil and adding perfume.



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ISLAND BUSH SNAPDRAGON

Scientific name: *Galvezia speciosa*

Plant family: Scrophulariaceae

Natural Information

Galvezia 'Firecracker' is a selection of *G. speciosa* with a compact habit, 2 – 3 feet tall with a 3 foot spread. Firecracker's lime green foliage is slightly fuzzy and contrasts nicely with its bright red flowers that bloom in spring and summer. The tubular red flowers make it a hummingbird favorite! Galvezia will grow fast and tolerates pruning to shape and does not require much maintenance.

Physical Description

- Flower: bright red, tubular shape. Flowers spring and summer
- Leaves: green
- Stems: compact and dense growth habit

Garden Tips/Extra Facts:

After the first or second year, plants can be cut back almost to the ground in the fall. Severe pruning is only recommended if the plant has become woody with age.



Theodore Payne Foundation



Landscape Resource



TOYON

Scientific name: *Heteromeles arbutifolia*
Plant family: Rosaceae

Natural Information

Toyon flowers in late spring, on N-NW facing locations in chaparral and mixed-evergreen forests, at elevations below 4265'. Common and co-dominant among its neighboring plants, this plant requires full sun exposure and its berries are an important winter food source for birds.

Physical Description

- Leaves: evergreen; shiny dark green above leaf; dull and pale below leaf
- Flower: clustered; 6"-8"; creamy white
- Fruit: bright red berry clusters in the fall; green berries in the summer; 4"-6"; mealy pulp
- Stem: grayish trunk bark
- Branches: numerous with leaves

Garden Tips/Extra Facts:

Grows from 8' to 12' tall as a shrub, and from 15' to 25' tall as a tree. Must be pruned in order to keep as a tree and this plant is fire-resistant.



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GOLDENBUSH

Scientific name: *Isocoma menziesii*
Plant family: Asteraceae

Natural Information

Goldenbush is a unique plant that comprises the habitat of the California Coastal gnatcatcher. Its flowering time is from April to December, and it is found on coastal sage scrub mixed with grassland, sandy slopes, sandy or pebbly beaches, and rocky cliffs, at elevations below 3940'. This plant experiences mixed, scattered co-dominance with its neighboring plants, and grows in dry humidity and full sun.

Physical Description

- Buds: 3/8" long; scaly covering
- Branches: sprawling, erect; dry material in lower old portion
- Flowers: 3/4" – 1/2" across; composed of small flowers 3/8" long each; 22 disk flowers per head; rich yellow
- Leaves: 1/2" - 1 1/4" form series of rosettes up stem; woolly grey-green; may be surrounded by round and possibly fuzzy protrusions
- Stem: slender
- Roots: heavy system

Garden Tips/Extra Facts:

Grows from 2' to 5' tall. These plants occur in prostrate and erect varieties. Hummingbirds, butterflies, and bees collect nectar from the flowers. Nice flowering subshrub, blooming when most others are finished.



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GIANT RYE-GRASS

Scientific name: *Leymus condensatus*
Plant family: Poaceae

Natural Information

Giant rye-grass is a perennial that flowers between May and July. Its seeding time is from September to October. Growing on NW facing slopes, it is common in mixed herb layers, open woodlands, dry slopes, canyons, and some hillsides at elevations below 4920'. Found in areas with full sun exposure and well-drained, sometimes nutritionally poor soil, it is a relatively abundant plant.

Physical Description

- Flower: gray-blue; wheat colored blooms with tan head; tops flower stalk
- Leaves: blades 1'-3' long; $\frac{3}{4}$ "-1 $\frac{1}{2}$ " wide; evergreen
- Root: rhizomes
- Seed: small
- Stem: 10"-15" flower stalk rises 1-2' above foliage

Garden Tips/Extra Facts:

Grows from 3' to 5' tall and from 2' to 3' wide. The best time to plant is in the spring. The plant is drought tolerant, wind pollinated, and hardy to below 15° F. The leaves' infusion relieves sore eyes. The dried leaves can be used to scrape pimples from underside of eyelid. Leaves can make paper. The stems can be used to thatch roofs. The roots can make a hair comb. Mats and rope can also be made. The seed, when ground into flour, can make bread, though the seed itself is small and hard to extract.



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DESERT WISHBONE BUSH

Scientific name: *Mirabilis californica*
Plant family: Nyctaginaceae

Natural Information

Desert wishbone bush flowers in the spring (often opening in the afternoon) in dry rocky areas, grassy areas, dunes, coastal bluff sage, and coastal sage scrub. This perennial grows in well-drained soils and is fairly common and abundant.

Physical Description

- Flower: 1/2" diameter; yellow anthers; 5 red-violet lobes, each 2 parted at end; supported by green cup; 5 stamens and round ovary
- Leaves: 3/4" - 1/2"; opposing; light to medium green
- Stem: tiny hairs; woody (below 8 dm); fragile; fork repeatedly; light to medium green
- Fruit: generally lightly dotted or wrinkled, glabrous

Garden Tips/Extra Facts:

Grows from 1' to 3' tall, and from 3' to 4' wide. This plant is intolerant of summer water. Plant is low growing. Plant is pollinated at night; Blossoms open mid-afternoon and remain open until early next day.



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COASTAL PRICKLY PEAR

Scientific name: *Opuntia littoralis*
Plant family: Cactaceae

Natural Information

Coastal prickly pear flowers from May to June on south-facing slopes in wild areas, steep banks, and coastal sage bluff, at elevations between 25' and 1310'. Somewhat of a rare plant, it attracts cactus wrens. Requires warmth and plenty of sun.

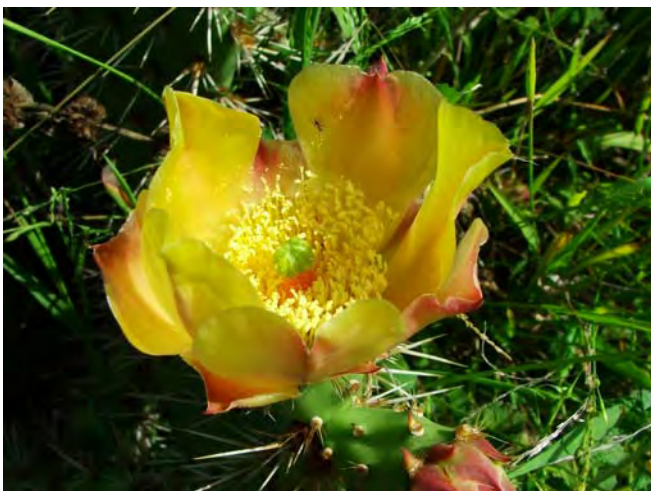
Physical Description

- Flower: 3"-4"; waxy; yellow (some flesh color blended in)
- Fruit: pear-shaped; bristled; purplish-red
- Leaves: 5"-10"; flat; oval shaped; fleshy

Garden Tips/Extra Facts:

Grows in clumps from 3' to 5' tall. Can grow from 20' to 30' wide, if colonies are not disturbed. The leaves and fruit (cactus apple) are edible. The plant is considered a variety of *O. occidentalis*. The fruit was called tunas by the Spanish Americans. Indians still eat them today. With the skin and spines carefully removed, the fleshy pads called nopales are sliced and eaten.

Cactus candy can be made by soaking ½" slices of the tunas overnight in cold water and simmering slowly in syrup consisting of 3 cups of sugar, ½ cup of water, 2 tablespoons of orange juice, 1 tablespoon of lemon juice until the syrup is almost absorbed.



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SHOWY PENSTEMON

Scientific name: *Penstemon spectabilis*
Plant family: Scrophylariaceae

Natural Information

Showy Penstemon is a spectacular spring and summer flowering upright perennial that is found in dry creek beds, hill sides and coastal bluffs of southern California. It reaches 3 feet tall and performs best in full sun and well-drained soil. To avoid root rot, Penstemons should be planted during the cooler months (mid fall through early spring). An excellent choice for the pollinator garden, the iridescent flowers attract hummingbirds, butterflies and bees.

Physical Description

- Flowers: lavender-purple with blue lobes; flowers April-June
- Leaves: leaf pairs are fused at the base and green in color

Garden Tips/Extra Facts:

Grows 3' tall and 3' wide. A very showy border plant (at the back, too big for the front). Needs good drainage and sun. Tolerates wide temperature and precipitation variations.



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BLADDERPOD

Scientific name: *Isomeris arborea*
Plant family: Capparaceae

Natural Information

Bladderpods flower throughout most of the year and grow on coastal bluffs, hills, desert washes, and flats at elevations below 4300'. It is relatively common in dry humidity and is co-dominant in mixed plant environments.

Physical Description

- Branches: Loosely branched; woody where the branch meets the trunk
- Flower: 6 long yellow anthers; minute hairs visible; 8-14 mm petals; yellow-green to yellow in color
- Fruit: smooth, leathery; light-brown
- Leaves: light grey-green
- Seed: mature seed pod is a bladder; pod is 1" – 2"; pod contains few seeds

Garden Tips/Extra Facts:

Grows from 2' to 4' tall. Considered stress-deciduous, so place where foliage loss will not be noticed, such as behind evergreen shrubs, or in out-of-the-way places. Excellent for restoration as a minor component of the vegetation.



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LEMONADE BERRY

Scientific name: *Rhus integrifolia*
Plant family: Anacardiaceae

Natural Information

Lemonadeberry is a shrub that can grow tall, but it mostly spreads outward, making attractive additions to coastal cliffs. From February to May, it flowers in large clusters. This shrub should be placed near trails and on visible hillsides to break up the landscape. This plant thrives on well drained soils and endures heat and windy conditions well. The species tolerates sandy as well as medium loam soils, and it can even thrive in nutrient deficient soil. It can not grow in shady conditions.

Physical Description

- Flowers: sepals green, margins glandular/ciliate, petals white to pinkish
- Leaves: simple, evergreen, elliptic to elliptic-lanceolate, obtuse, margin entire to toothed
- Fruit: reddish, glandular-hairy, very small

Garden Tips/Extra Facts:

Grows up to 15' tall and 10' wide. Very dense and aromatic (lemon scent). Berries are edible and great for a bird garden. The growth habit is slow to moderate and, as a garden plant, this species is quite resistant to deer. Its cultural requirements should mimic its natural environment with ample drainage and little summer water.



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PURPLE SAGE

Scientific name: *Salvia leucophylla*
Plant family: Lamiaceae

Natural Information

Purple sage is found on hillsides, banks, ocean bluffs, and coastal sage, at elevations between 160' and 2500'. This shrub flowers from April to June on south to eastern-facing slopes in full sunlight and dry, disturbed conditions. It is common in well-drained soils and honeybees use this plant to make sage honey.

Physical Description

- Flower: 1/4" – 1/2" across; aromatic; rosy-lavender
- Fruit: 4 nutlets; brown or gray
- Leaves: 3/4" – 3 3/4"; shape of truncated oblong; heart-shaped; small teeth, edges may be rolled under; dense hairs; light-grey; opposite; gland-dotted; becomes greener in the wintertime
- Seed: nut
- Stem: woody; dry; erect

Garden Tips/Extra Facts:

Grows from 3' to 6' tall. It should only be watered in early growth, otherwise plant will grow rank. The purple sage normally exhibits dormancy during the summer period. A seasoning can be made from its dried leaves, and when crushed, it emits a strong sage fragrance. Oils in the plant also make it burn vigorously.



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BLACK SAGE

Scientific name: *Salvia mellifera*
Plant family: Lamiaceae

Natural Information

Black sage grows in rich soils in full sunlight, on hillsides, banks, and coastal sage scrub. It can stabilize disturbed plant areas and it is another sage honey source for honeybees. Flowering from April to June, this plant is fairly common.

Physical Description

- Branch: loose
- Flower: white to pale lavender or a blue- white
- Leaves: hairy undersides; oblong to elliptic; dark green
- Stem: woody

Garden Tips/Extra Facts:

Grows from 3' to 6' tall. Seeds can be planted in March or April in a greenhouse, otherwise seedlings should be planted during early summer. Cuttings can be planted any time in the growing season. Nitrogen rich soil may induce excessive leafing and flowering. Dried leaves and stems from this plant are used for seasoning, as they emit a strong sage smell when crushed. The aromatic leaves can also be used as tea, as they were once valued for medicinal purposes by the Chinese. Grinding the seeds can produce gruel. The leaves can be used to treat gas and cardiac pains or can be made into a poultice for ear and throat pains. The plant can also be used to treat chronic bronchial coughs, while a decoction can be made for bathing and treatment of paralysis.



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BLUE ELDERBERRY

Scientific name: *Sambucus mexicana*
Plant family: Caprifoliaceae

Natural Information

Blue elderberry mostly flowers in the spring, with sparse blooms during the summer. Growing in canyons, stream banks, and open places in forest, this plant is tolerant of wind, shade, and extra water. Extremely common in moist soils, scattered among many other kinds of plants, it is insect pollinated and birds prize its fruit.

Physical Description

- Branch: tall, drooping; contain dead material inside
- Flower: 1/8" each, forms a cluster 3" – 6" across; cream-yellow
- Fruit: berries appear in summer and fall; blue-grey from powdery coating
- Leaves: 2"-3" long, 1" wide; oval to elliptical; groups of 5 to 7; bright-green
- Stem: trunk may be up to 18" in diameter; as wide as tall

Garden Tips/Extra Facts:

Grows from 10' to 20' tall. The seeds should be sown in early autumn when they are ripe so that they will germinate in early spring. If they have been stored, they should be sown in the spring in a cold frame and will germinate better if given two months of warm stratification followed by two months of cold stratification. Seedlings can be pricked out when large enough to handle, and if good growth has been made, can be put in permanent positions. The edible berries are often dried for pies, preserves, or wine. The flowers are also edible either raw or cooked. A blossom infusion from this plant can treat upset stomach, colds, flu, and fever, while its roots can be used in a concoction to alleviate constipation.



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BLUE-EYED GRASS

Scientific name: *Sisyrinchium bellum*
Plant family: Iridaceae

Natural Information

Blue-eyed Grass is a clumping, herbaceous perennial with grass-like leaves to 12 inches high, and spreading by creeping rhizomes, so the colony enlarges each year. A member of the Iris family that occurs on open grassy areas throughout much of California. Its profuse, starry blue-purple flowers have a pretty yellow eye in the center and appear January-June. Plant in full sun in coastal and intermediate areas, and water twice a month during the warm summer months.

Physical Description

- Flower: iris-shaped blue-purple petals
- Leaves: grow in an iris-like fan shape, gray-green in color.

Garden Tips/Extra Facts:

Nice in front of mixed borders, in containers and for filling in around plantings of shrubs and trees.



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