

**West Stege Marsh Upland Revegetation Plan (2003-5)
U.C. Berkeley Field Station**

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Prepared for Blasland, Bouck & Lee, INC.

By

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1. INTRODUCTION

Current remediation efforts at the West Stege Marsh have provided an opportunity to enhance the native plant community diversity through revegetation of the ecotone and upland areas following fill removal. One goal of the revegetation project detailed below is to promote species diversity within the regraded marsh upland habitat. It will also indirectly address the following goal set forth in the Biological Assessment (Blasland, Bouck and Lee, 2003): “habitat enhancement by removing invasive/exotics plant species from the coastal scrub habitat” by establishing native coastal scrub to reduce colonization and competition from invasive plant species such as pampas grass (*Cortaderia jubata*), fennel (*Foeniculum vulgare*) and Harding grass (*Phalaris aquatica*) in recently graded areas.

Actions covered in this plan will also directly address a second goal articulated in the Biological Assessment: “Create an ecotone from high marsh to upland to improve California clapper rail upland refugial access.” This will be accomplished by establishing native vegetation cover and structure in the upland areas that will provide suitable refugia for the California clapper rail (*Rallus longirostris obsoletus*) and other marsh birds from predators during high tide events.

The plan is also consistent with the goals set forth by the Bay Area Wetland Ecosystem Habitat Goals Project plan which state that “restoration opportunities which link tidal marshes to upland and alluvial soils, seeps, drainages should be given high priority in restoration planning” because “most floristic diversity in tidal marshes was concentrated along the upper marsh edge, where transitions between high tidal marsh and local soils, seeps, and drainages created ecologically important variation in environmental conditions.” The Project also recommends that “opportunities to restore sites which connect tidal marshes to upland soils, creeks, seeps, be given at least as much priority as marsh restoration sites located adjacent to tidal sloughs.” (Goals Project, 1999)

The University of California at Berkeley (UCB) Richmond Field Station (RFS) supports grassland and wetland habitat of high ecological value. The RFS occupies approximately 72 acres of marsh and mudflat, and 23 acres of upland habitats. Included within these areas are a diversity of habitat types that support a number of native vegetation communities including salt and brackish marsh, freshwater meadow and seep associations, and coastal scrub. Many of these habitats have been disturbed through the introduction of fill materials, the invasion of non-native plant species, increased development, and the impacts of past industrial operations from on (and off) site sources. Today, these habitats support more than 62 native plant species, including some that are considered locally rare. In addition West Stege marsh supports a diversity of wildlife species including the federally endangered (California clapper rail).

2. REVEGETATION PLANT PALETTE

Species Selection

The species selected for the upland areas of the marsh were chosen by referencing the native species observed on the RFS and within adjacent upland areas as well as other local native grasslands and upland scrub plant communities. This was used to generate a general list of upland native species which is guiding propagule collection (seed and cuttings) for outplanting next year (see Table 1 for list). Additional species may be added to this list after a more extensive review of early botanical and herbarium records.

Table 1 identifies of the native species proposed for revegetation on the upland areas at the West Stege Marsh restoration site.

Table 1

Scientific Name	common name	Family
<i>Achillea millefolium</i>	Yarrow	Asteraceae
<i>Allium dichlamydeum</i>	Coast Red Onion	Liliaceae
<i>Anaphalis margaritacea</i>	Pearly Everlasting	Asteraceae
<i>Artemisia californica</i>	California sagebrush	Asteraceae
<i>Artemisia douglasiana</i>	mugwort	Asteraceae
<i>Aster chilensis</i>	California Aster	Asteraceae
<i>Astragalus gambellianus</i>	Milkvetch, Dwarf Loco Weed	Fabaceae
<i>Baccharis douglasii</i>	Marsh baccharis	Asteraceae
<i>Baccharis pilularis</i>	Coyote brush	Asteraceae
<i>Brodiaea elegans</i>	Harvest Brodiaea	Liliaceae
<i>Bromus carinatus</i> ssp. <i>carinatus</i>	California Brome	Poaceae
<i>Bromus carinatus</i> ssp. <i>maritimus</i>	Seaside Brome	Poaceae
<i>Calandrinia ciliata</i>	Red Maids	Portulacaceae
<i>Castilleja densiflora</i>	Owl's Clover	Scrophulariaceae
<i>Castilleja</i> sp.?	Indian Paintbrush	Scrophulariaceae
<i>Chlorogalum pomeridianum</i> var. <i>divaricatum</i>	Soap Plant	Liliaceae
<i>Danthonia californica</i> var. <i>california</i>	California Oatgrass	Poaceae
<i>Deschampsia cespitosa</i> ssp. <i>Holciformis</i>	Tufted hairgrass	Poaceae
<i>Dichelostemma capitatum</i>	Blue Dicks, Wild Hyacinth	Liliaceae
<i>Dichondra donelliana</i>	Dichondra	Convolvulaceae
<i>Distichlis spicata</i>	Saltgrass	Poaceae
<i>Elymus glaucus</i>	wild rye	Poaceae
<i>Eriogonum latifolium</i>	Coast buckwheat	Polygonaceae
<i>Eriophyllum staechadifolium</i>	Lizard-tail, Seaside wooly sunflower	Asteraceae
<i>Eschscholzia californica</i> var. <i>maritime</i>	California coastal poppy	Papaveraceae
<i>Festuca rubra</i>	Red fescue	Poaceae
<i>Fragaria chiloensis</i>	Beach or Dune Strawberry	Rosaceae
<i>Grindelia stricta</i>	Gumweed	Asteraceae
<i>Hordeum brachyantherum</i>	Meadow barley	Poaceae
<i>Iris douglasiana</i>	Douglas Iris	Iridaceae
<i>Iris longipetala</i>	Coast iris	Iridaceae
<i>Koeleria macrantha</i>	June Grass	Poaceae
<i>Lasthenia californica</i>	Goldfields	Asteraceae
<i>Layia platyglossa</i>	Tidy Tips	Asteraceae
<i>Leymus triticoides</i>	Valley Wild-rye	Poaceae
<i>Lomatium caruifolium</i>	Lomatium	Apiaceae
<i>Lomatium dasycarpum</i>	Wooly Parsnip	Apiaceae
<i>Lotus scoparius</i>	Deer Weed, California Broom	Fabaceae

Scientific Name	common name	Family
<i>Lupinus arboreus</i>	Yellow Bush Lupine	Fabaceae
<i>Lupinus bicolor</i>	annual lupine	Fabaceae
<i>Lupinus nanus</i>	Sky Lupine	Fabaceae
<i>Lupinus variicolor</i>	Varicolored Lupine	Fabaceae
<i>Marah fabaceus</i>	Man-root, Wild Cucumber	Cucurbitaceae
<i>Melica californica</i>	California Melica	Poaceae
<i>Mimulus aurantiacus</i>	Sticky or Bush Monkey Flower	Scrophulariaceae
<i>Monardella villosa</i>	Western Pennyroyal	Lamiaceae
<i>Nassella lepida</i>	Foothill Needlegrass	Poaceae
<i>Nassella pulchra</i>	Purple Needlegrass	Poaceae
<i>Navarretia squarrosa</i>	Skunkweed	Polemoniaceae
<i>Perideridia kelloggii</i>	Yampah	Apiaceae
<i>Phacelia californica</i>	California coast phacelia	Hydrophyllaceae
<i>Phacelia distans</i>	wild heliotrope	Hydrophyllaceae
<i>Phalaris californica</i>	California Canary Grass	Poaceae
<i>Plantago erecta</i>	drarf plantain	Plantaginaceae
<i>Polypodium californicum</i>	California Polypody	Polypodiaceae
<i>Pteridium aquilinum</i> var. <i>pubescens</i>	Bracken Fern	Dennstaedtiaceae
<i>Ranunculus californicus</i>	California Buttercup	Ranunculaceae
<i>Rhamnus californica</i>	California Coffeeberry	Rhamnaceae
<i>Sanicula arctopoides</i>	Footsteps-of-Spring	Apiaceae
<i>Sanicula bipinnatifida</i>	Purple Sanicle	Apiaceae
<i>Sanicula crassicaulis</i>	pacific snakeroot	Apiaceae
<i>Satureja douglasii</i>	Yerba Buena	Lamiaceae
<i>Scrophularia californica</i>	California Figwort	Scrophulariaceae
<i>Sidalcea malvaeflora</i>	Checkerbloom, Wild Hollyhock	Malvaceae
<i>Sisyrinchium bellum</i>	Blue-Eyed Grass	Iridaceae
<i>Solidago californica</i>	California Goldenrod	Asteraceae
<i>Trifolium willdenovii</i>	Tomcat Clover	Fabaceae
<i>Trifolium wormskioldii</i>	Cow Clover, Coast Clover	Fabaceae
<i>Triphysaria pusilla</i>	Dwarf Owl's Clover	Scrophulariaceae
<i>Triteleia laxa</i>	Ithuriel's spear	Liliaceae
<i>Viola adunca</i>	Blue or Western Dog violet	Violaceae
<i>Wyethia angustifolia</i>	Narrow-leaf mule's ears	Asteraceae

Propagule Collection Site Selection

Because the West Stege Marsh restoration site does not support all of the species outlined in Table 1, collection sites have been chosen outside of the restoration footprint. It is anticipated that plant materials collected from local off-site areas will share genetic links to historic plant populations or originate from sites with conditions similar to the West Stege marsh and uplands. To achieve these, the following factors were considered when selecting propagule collection sites:

- 1) ecological habitat similarity
- 2) natural species dispersal vectors;
- 3) proximity to the introduction site.

3. NURSERY PROPAGATION AND OUTPLANTING GOALS

Determination of Propagation Goals

The native upland plant species will be planted at a density of a plant every 4 sq. ft. or on four foot centers. This density is needed to establish full native plant cover within several years of revegetation and prevent the reinvasion of aggressive non-natives such as pampas grass and fennel.

For the marsh upland revegetation component of the environmental remediation effort, all plantings will occur above 6 ft. NGVD elevation. The upland areas have been divided into four discrete revegetation areas/subsites (Figure 1). Each area will support a slightly different plant palette designed to match the subtle differences in soil, hydrology, aspect, drainage and need for the upland vegetation to act as high tide refugia for the clapper rail and other marsh birds. Below is a list of the four upland sub-sites:

Sub-sites:

- 1.) the island(s) above the 6 ft NGVD level at 0.4 acres,
- 2.) the fill slope that is the south boundary of the marsh from the bridge to the site's south-east corner or the East Bay Regional Parks District property at 0.4 acres,
- 3.) the upland, north of the regraded marsh at 2.5 acres¹, and
- 4.) the area referred to as the bulb at the north-west of the regraded marsh above the 6 foot NGVD elevation at 2.2 acres.

Blasland, Bouck & Lee, Inc. estimated the total upland planting areas to be approximately 5.5 acres².

Propagation ratios for the coastal scrub were developed to generally mimic native scrub plant communities. Relative species assemblage proportions were based on soil types present, field observations of similar local assemblages, past project experience and the goal of providing upland vegetated refugia for the California clapper rail and other marsh birds.

Propagation goals for the grasslands areas were developed to assist in continued propagule collection 2004. Initial goals were determined using URS's inventory data (2003), and ESTP vegetation inventory data (AOI, 2003). These will be refined through further analysis of data collected in investigation of local grassland remnants. Grassland revegetation will focus on mitigating the impacts to the grassland habitat that was lost as a part of the remediation staging facilities. Once the location of the grassland mitigation project is determined, revegetation goals will be refined. Grassland propagation collection began in Spring 2003, and will continue throughout 2004. It is anticipated that additional outplanting will occur in 2005 to address mortality and outplant species with limited propagule sources. Propagation goals for all four sub-sites are listed in Appendix 1.

The propagation goals for sub-site # 3 (the north upland) and sub-site #4 (the upland bulb), (Tables 4,5,6) were generated with half the area to be restored to native coastal scrub and the other half to native grassland. The density for these two vegetation types will be planted on 4 foot centers for scrub and 2 foot centers for grasslands, due to the differences in the size of adult plants among these two native plant communities.

¹ While this plan calculates revegetation goals assuming an upland acreage of 2.5 acres, it is recognized that future land use planning could reduce this area, and therefore the propagation goals.

² See above footnote

It is important to note, that the proposed propagation goals may be adjusted based upon limited propagule availability, high levels of natural recruitment of one or more species, or a determination from the project manager (BBL Inc.). However, unless otherwise determined by the project manager, the total number of plants grown for revegetation purposes will remain the same.

4. PROPAGULE COLLECTION

Guidelines

Propagule collection will be performed by AOI staff with support from UC Berkeley ESTP students and community volunteers. Upland marsh species propagule collection began during summer 2003, and will continue through fall 2004-5.

Seeds will be collected by hand in paper envelopes or grocery bags. To protect propagule resources, no more than 10% of the seeds from any 1 population or individual plant will be collected throughout the season. Seeds will be collected from each species throughout its ripening season in order to include a diverse range of flowering times in the collection pool. Divisions will be extracted using flat-bladed shovels. Records pertaining to propagule collection will be recorded, and included in a final revegetation report.

Propagule collection permits and records

Permits have either been acquired, or requested from the collection sites to secure propagules for the West Stege Marsh restoration efforts. A list of collection sites and propagules collected will be included in the final revegetation report. Propagules for a number of locally rare species will be collected over several years as they have limited population sizes and distribution. These species will be planted during the first two years of the project.

5. OUTPLANTING DESIGN

Figure 1 includes a map of the final grading plan with the specific upland areas designated. This map was used to develop the outplanting design and propagation goals.

Planting Design

No larger species such as toyon (*Heteromeles arbutifolia*) and California wax myrtle (*Myrica californica*) will be planted as a part of this upland restoration project, so as to not introduce possible perching habitat for species that may prey on clapper rails. Most scrub species and all the sub-shrubs and grasses will be planted in clusters of 3 to 7 individuals to mimic natural patchiness. Clusters of the remaining individual species will be randomly distributed within the planting areas.

In the sub-sites where both grassland and scrub species will be revegetated (#3 and #4), scrub species will generally be planted along the upland margins of the marsh to act as high tide refugia for the California clapper rail and other birds and the native grassland species will be planted in the flatter upland areas. The planting design will incorporate patches of grassland habitat connected to marsh ecotone for biodiversity with a buffer of scrub around the outer edges of the grassland areas to act as a natural buffer to plant invasion and off-trail foot traffic across the restored grassland. The few scrub oaks proposed for revegetation will be planted away from the marsh along the fence line of the field station facilities.

Outplanting

Outplanting will be phased over three years with the majority of the outplantings occurring in the first 2 years. Outplanting will begin in November 2004 and continue through February 2006. The timing of planting will coincide with the beginning of the winter rains (November - January) to provide a critical period of soil moisture to allow for plant establishment.

Temporary irrigation may be needed to establish the upland scrub species, and will need to be designed and coordinated with UC Berkeley if it is required.

Fertilization will be needed particularly on the rocky fill slope areas that is the upland southern edge of the marsh (EBRP's land). Fertilization for the individual plants will be accomplished through the insertion of several time released fertilizer ozmocote granules into each individual planting hole prior to outplanting.

6. SITE PREPARATION AND MAINTENANCE

All erosion control measures will be installed as part of the site remediation. Any significant erosion problems that occur will be addressed by UC Berkeley. If regraded areas are compacted to the point that they may impede plant establishment, alternative actions such as ripping the compacted soils before outplanting will be discussed with UC Berkeley staff.

The upland areas will be weeded consistent with the Invasive Plant Species Management Plan.

7. REFERENCES

Goals Project. 1999. Baylands Ecosystem Habitat Goals. A report of the habitat recommendations. U. S. Environmental Protection Agency, San Francisco, CA.

Biological Assessment, Richmond Field Station Remediation Project Report. 2003. Blasland, Bouck & Lee, Inc.

California Environmental Quality Act, Initial Study - Richmond Field Station Remediation Project. 2003 URS Corporation.

APPENDIX I
PROPAGATION GOALS FOR RFS SUBSITES

Table 1. identifies revegetation goals for sub-site #1: the marsh islands. (total area – 0.4 acres)

Table 1.

Scientific Name	common name	%	# of plants on
			planting 4 ft. centers density
<i>Achillea millefolium</i>	Yarrow	5	54
<i>Anaphalis margaritacea</i>	Pearly Everlasting	3	33
<i>Artemisia californica</i>	California sagebrush	10	109
<i>Aster chilensis</i>	California Aster	7	76
<i>Baccharis pilularis</i>	Coyote brush	15	163
<i>Bromus carinatus</i> ssp. <i>maritimus</i>	California Brome, Seaside Brome	3	33
<i>Ceanothus thyrsiflorus</i>	Coast Blue Blossom, California Lilac	3	33
<i>Elymus glaucus</i> ssp. <i>glaucus</i>	Blue wild rye, Western Wild Rye	3	33
<i>Eriogonum latifolium</i>	Coast buckwheat	5	54
<i>Eriophyllum staechadifolium</i>	Lizard-tail, Seaside wooly sunflower	10	109
<i>Eschscholzia californica</i>	California poppy	seed	
<i>Festuca rubra</i>	Red fescue	5	54
<i>Fragaria chiloensis</i>	Beach or Dune Strawberry	3	33
<i>Grindelia stricta</i>	Gumweed	2	22
<i>Hordeum brachyantherum</i>	Meadow barley	5	54
<i>Leymus triticoides</i>	Valley Wild-rye	3	33
<i>Lotus scoparius</i>	Deer Weed, California Broom	7	76
<i>Lupinus arboreus</i>	Yellow Bush Lupine, Tree Lupine	seed	
<i>Mimulus aurantiacus</i>	Sticky or Bush Monkey Flower	3	33
<i>Nassella pulchra</i>	Purple Needlegrass	5	54
<i>Solidago californica</i>	California Goldenrod	3	33
		total	100 1035

Table 2 identifies revegetation goals for sub-site #2: the fill slope. (total area - 0.4 acres)

Table 2.

Scientific Name	common name	%	# of plants on
		planting	4 ft. centers
		density	
Achillea millefolium	Yarrow	7	76
Artemisia californica	California sagebrush	13	142
Aster chilensis	California Aster	5	54
Baccharis pilularis	Coyote brush	15	163
Nassella pulchra	Purple Needlegrass	5	54
Eriogonum latifolium	Coast buckwheat	5	54
Eriophyllum staechadifolium	Lizard-tail, Seaside wooly sunflower	15	163
Grindelia stricta	Gumweed	2	22
Lotus scoparius	Deer Weed, California Broom	7	76
Lupinus arboreus	Yellow Bush Lupine, Tree Lupine	seed	
Mimulus aurantiacus	Sticky or Bush Monkey Flower	5	54
Solidago californica	California Goldenrod	2	22
		100	882

Table 3 identifies revegetation goals for sub-site #3: the north upland. (total area – 1.25 acres)

Table 3.

Scientific Name	common name	%	# of plants on
		planting	4 ft. centers
		density	
<i>Achillea millefolium</i>	Yarrow	2	68
<i>Anaphalis margaritacea</i>	Pearly Everlasting	2	68
<i>Artemisia californica</i>	California sagebrush	10	340
<i>Artemisia douglasiana</i>	mugwort	2	68
<i>Aster chilensis</i>	California Aster	5	170
<i>Baccharis pilularis</i>	Coyote brush	10	340
<i>Bromus carinatus</i> ssp. <i>maritimus</i>	California Brome, Seaside Brome	1	34
<i>Elymus glaucus</i> ssp. <i>glaucus</i>	Blue wild rye, Western Wild Rye	3	102
<i>Eriogonum latifolium</i>	Coast buckwheat	5	170
<i>Eriophyllum staechadifolium</i>	Lizard-tail, Seaside wooly sunflower	7	238
<i>Eschscholzia californica</i>	California poppy	seed	
<i>Festuca rubra</i>	Red fescue	3	102
<i>Fragaria chiloensis</i>	Beach or Dune Strawberry	3	102
<i>Gnaphalium ramosissimum</i>	fragrant cudweed	seed	
<i>Grindelia stricta</i>	Gumweed	1	34
<i>Hordeum brachyantherum</i>	Meadow barley	3	102
<i>Leymus triticoides</i>	Valley Wild-rye	2	68
<i>Lotus scoparius</i>	Deer Weed, California Broom	5	170
<i>Lupinus arboreus</i>	Yellow Bush Lupine, Tree Lupine	seed	
<i>Marah fabaceus</i>	Man-root, Wild Cucumber	seed	
<i>Mimulus aurantiacus</i>	Sticky or Bush Monkey Flower	5	170
<i>Nassella pulchra</i>	Purple Needlegrass	3	102
<i>Phacelia californica</i>	California coast phacelia	2	68
<i>Phacelia distance</i>	wild heliotrope	seed	
<i>Rhamnus californica</i>	California Coffeeberry	6	204
<i>Satureja douglasii</i>	Yerba Buena	3	102
<i>Scrophularia californica</i>	California Figwort	5	170
<i>Solidago californica</i>	California Goldenrod	2	68
		100	2995

Table 4 identifies grassland revegetation goals for the north upland area.

Table 4.

Species Name	Common Name	% planting density	grassland plant # # on 2ft. centers
*The following species are combined to make up a total of 15% of species planted. Each species planting density will be based upon propagule availability and may be outplanted as divisions, bulbs or seeds.		15	2042
Achillea millefolium	Yarrow	1	136
Allium dichlamydeum	Coast Red Onion	1	136
Anaphalis margaritacea	Pearly Everlasting	1	136
Aster chilensis	California Aster	2	272
Astragalus gambellianus	Milkvetch, Dwarf Loco Weed	*	
Brodiaea elegans	Harvest Brodiaea	*	
Bromus carinatus ssp. carinatus	California Brome, Mountain Brome	5	681
Calandrinia ciliata	Red Maids	seed	
Castilleja densiflora	Owl's Clover	seed	
Castilleja sp.?	Indian Paintbrush	2	272
Chlorogalum pomeridianum var. divaricatum	Soap Plant	2	272
Claytonia perfoliata	Miner's Lettuce	seed	
Danthonia californica var. californica	California Oatgrass	7	953
Deschampsia cespitosa ssp. holciformis	Tufted hairgrass	2	272
Dichelostemma capitatum	Blue Dicks, Wild Hyacinth	1	136
Dichondra donelliana	Dichondra	*	
Elymus glaucus	wild rye	5	681
Eriogonum latifolium	Coast buckwheat	3	408
Eschscholzia californica var. maritima	California coastal poppy	seed	
Festuca rubra	Red fescue	5	681
Fragaria chiloensis	Wild Strawberry	5	681
Hordeum brachyantherum	Meadow barley	5	681
Iris douglasiana	Douglas Iris	2	272
Koeleria macrantha	June Grass	3	408
Lasthenia californica	Goldfields	seed	
Layia platyglossa	Tidy Tips	seed	
Leymus triticoides	Valley Wild-rye	2	272
Lomatium caruifolium	lomatium	*	
Lomatium dasycarpum	Wooly Parsnip	*	
Lupinus bicolor	Miniature Lupine, Annual Lupine	seed	

Species Name	Common Name	%	grassland plant #
Lupinus nanus	Sky Lupine	seed	
Lupinus variicolor	Varicolored Lupine, Varied Lupine	5	681
Melica californica	California Melica	5	681
Monardella villosa	Western Pennyroyal	*	
Nassella lepida	Foothill Needlegrass	5	681
Nassella pulchra	Purple Needlegrass	5	681
Navarretia squarrosa	Skunkweed	seed	
Perideridia kelloggii	Yampah	*	
Phacelia californica	California coast phacelia	*	
Phalaris californica	California Canary Grass	*	
Plantago erecta	drarf plantain	seed	
Pteridium aquilinum var. pubescens	Western Bracken, Bracken Fern	*	
Ranunculus californicus	California Buttercup	2	272
Sanicula arctopoides	Footsteps-of-Spring	*	
Sanicula bipinnatifida	Purple Sanicle	*	
Satureja douglasii	Yerba Buena	3	408
Sidalcea malvaeflora	Checkerbloom, Wild Hollyhock	2	272
Sisyrinchium bellum	Blue-Eyed Grass	2	272
Trifolium willdenovii	Tomcat Clover	seed	
Trifolium wormskioldii	Cow Clover, Coast Clover	*	
Triphysaria pusilla	Owl's Clover, Dwarf Owl's Clover	seed	
Triteleia laxa	Ithuriel's spear	2	272
Viola adunca	Blue or Western Dog violet	*	
Wyethia angustifolia	Narrow-leaf mule's ears	seed	
		total	13613

Appendix 5 identifies scrub revegetation goals for sub-site #4: the upland bulb area. (total area - 1.1 acres)

Appendix 5

Scientific Name	common name	coastal scrub	
		% planting density	# of plants on 4 ft. centers
<i>Achillea millefolium</i>	Yarrow	3	90
<i>Anaphalis margaritacea</i>	Pearly Everlasting	2	60
<i>Artemisia californica</i>	California sagebrush	13	389
<i>Aster chilensis</i>	California Aster	5	150
<i>Baccharis pilularis</i>	Coyote brush	13	389
<i>Elymus glaucus</i> ssp. <i>glaucus</i>	Blue wild rye	2	60
<i>Eriogonum latifolium</i>	Coast buckwheat	3	90
<i>Eriophyllum staechadifolium</i>	Lizard-tail, Seaside wooly sunflower	10	299
<i>Eschscholzia californica</i>	California poppy	seed	
<i>Festuca rubra</i>	Red fescue	2	60
<i>Fragaria chiloensis</i>	Beach or Dune Strawberry	3	90
<i>Gnaphalium ramosissimum</i>	fragrant cudweed	seed	
<i>Grindelia stricta</i>	Gumweed	1	30
<i>Hordeum brachyantherum</i>	Meadow barley	2	60
<i>Lotus scoparius</i>	Deer Weed, California Broom	5	150
<i>Lupinus arboreus</i>	Yellow Bush Lupine, Tree Lupine	seed	
<i>Marah fabaceus</i>	Man-root, Wild Cucumber	seed	
<i>Mimulus aurantiacus</i>	Sticky or Bush Monkey Flower	7	210
<i>Phacelia californica</i>	California coast phacelia	2	60
<i>Phacelia distance</i>	wild heliotrope	seed	
<i>Rhamnus californica</i>	California Coffeeberry	5	150
<i>Satureja douglasii</i>	Yerba Buena	2	60
<i>Scrophularia californica</i>	California Figwort	5	150
<i>Solidago californica</i>	California Goldenrod	2	60
		total	100
			2515

Appendix 6 identifies grassland revegetation goals for sub-site #4: the upland bulb area. (total area - 1.1 acres)

Appendix 6

Species Name	Common Name	% planting density	grassland plant # on 2 ft. centers
*The following species are combined will make up a total of 15% of species planted.		15	1797
Each species planting density will be based upon propagule availability.			
Achillea millefolium	Yarrow	1	120
Allium dichlamydeum	Coast Red Onion	1	120
Anaphalis margaritacea	Pearly Everlasting	1	120
Aster chilensis	California Aster	2	240
Astragalus gambellianus	Milkvetch, Dwarf Loco Weed	*	
Brodiaea elegans	Harvest Brodiaea	*	
Bromus carinatus ssp. carinatus	California Brome, Mountain Brome	5	599
Calandrinia ciliata	Red Maids	seed	
Castilleja densiflora	Owl's Clover	seed	
Castilleja sp.?	Indian Paintbrush	2	240
Chlorogalum pomeridianum var. divaricatum	Soap Plant	2	240
Claytonia perfoliata	Miner's Lettuce	seed	
Danthonia californica var. californica	California Oatgrass	7	839
Deschampsia cespitosa ssp. holciformis	Tufted hairgrass	2	240
Dichelostemma capitatum	Blue Dicks, Wild Hyacinth	1	120
Dichondra donelliana	Dichondra	*	
Elymus glaucus	wild rye	5	599
Eriogonum latifolium	Coast buckwheat	3	359
Eschscholzia californica var. maritima	California coastal poppy	seed	
Festuca rubra	Red fescue	5	599
Fragaria chiloensis	Wild Strawberry	5	599
Hordeum brachyantherum	Meadow barley	5	599
Iris douglasiana	Douglas Iris	2	240
Koeleria macrantha	June Grass	3	359
Lasthenia californica	Goldfields	seed	
Layia platyglossa	Tidy Tips	seed	
Leymus triticoides	Valley Wild-rye	2	240
Lomatium caruifolium	lomatium	*	

Species Name	Common Name	%	grassland plant #
Lomatium dasycarpum	Wooly Parsnip	*	
Lupinus bicolor	Miniature Lupine, Annual Lupine	seed	
Lupinus nanus	Sky Lupine	seed	
Lupinus variicolor	Varicolored Lupine, Varied Lupine	5	599
Melica californica	California Melica	5	599
Monardella villosa	Western Pennyroyal	*	
Nassella lepida	Foothill Needlegrass	5	599
Nassella pulchra	Purple Needlegrass	5	599
Navarretia squarrosa	Skunkweed	seed	
Perideridia kelloggii	Yampah	*	
Phacelia californica	California coast phacelia	*	
Phalaris californica	California Canary Grass	*	
Plantago erecta	drarf plantain	seed	
Pteridium aquilinum var. pubescens	Western Bracken, Bracken Fern	*	
Ranunculus californicus	California Buttercup	2	240
Sanicula arctopoides	Footsteps-of-Spring	*	
Sanicula bipinnatifida	Purple Sanicle	*	
Satureja douglasii	Yerba Buena	3	359
Sidalcea malvaeflora	Checkerbloom, Wild Hollyhock	2	240
Sisyrinchium bellum	Blue-Eyed Grass	2	240
Trifolium willdenovii	Tomcat Clover	seed	
Trifolium wormskioldii	Cow Clover, Coast Clover Owl's Clover, Dwarf Owl's Clover	*	
Triphysaria pusilla		seed	
Triteleia laxa	Ithuriel's spear	2	240
Viola adunca	Blue or Western Dog violet	*	
Wyethia angustifolia	Narrow-leaf mule's ears	seed	
			11979

Appendix 7 identifies the plant species propagule availability and gathering time.

Appedix 7

Scientific Name	Seed gathering window	
<i>Achillea millefolium</i>	Jun	Nov
<i>Allium dichlamydeum</i>	Jun	Sep
<i>Anaphalis margaritacea</i>	Jul	Nov
<i>Artemisia californica</i>	Nov	Nov
<i>Artemisia douglasiana</i>	Oct	Nov
<i>Aster chilensis</i>	Aug	Nov
<i>Astragalus gambellianus</i>	May	Jun
<i>Brodiaea elegans</i>	Sep	Oct
<i>Bromus carinatus</i> ssp. <i>Carinatus</i>	May	Jul
<i>Bromus carinatus</i> ssp. <i>Maritimus</i>	May	Sep
<i>Calandrinia ciliata</i>	Mar	Jun
<i>Castilleja densiflora</i>	Jul	Sep
<i>Castilleja</i> sp.?		
<i>Ceanothus thyrsiflorus</i>	Jun	Jul
<i>Chlorogalum pomeridianum</i> var. <i>divaricatum</i>	Jun	Nov
<i>Danthonia californica</i> var. <i>california</i>	Jun	Jul
<i>Deschampsia cespitosa</i> ssp. <i>Holciformis</i>	Jun	Aug
<i>Dichelostemma capitatum</i>	May	Oct
<i>Dichondra donelliana</i>		
<i>Distichlis spicata</i>	Sep	Nov
<i>Elymus glaucus</i>	May	Oct
<i>Eriogonum latifolium</i>	Jun	Nov
<i>Eriophyllum staechadifolium</i>	Jul	Nov
<i>Eschscholzia californica</i>	May	Oct
<i>Eschscholzia californica</i> var. <i>maritime</i>	May	Oct
<i>Festuca rubra</i>	Apr	Jun
<i>Fragaria chiloensis</i>	divisions	
<i>Grindelia stricta</i>	Jul	Nov
<i>Hordeum brachyantherum</i>	May	Sep
<i>Iris douglasiana</i>	Jul	Oct
<i>Iris longipetala</i>	Jun	Jul
<i>Koeleria macrantha</i>	Jun	Sep
<i>Lasthenia californica</i>	Apr	Jun
<i>Layia platyglossa</i>	Apr	May
<i>Leymus triticoides</i>	Divisions	
<i>Lomatium caruifolium</i>	Apr	Jun
<i>Lomatium dasycarpum</i>	Jun	Jun

Scientific Name	Seed gathering window	
Lotus scoparius	Jul	Oct
Lupinus arboreus	Jul	Aug
Lupinus bicolor	May	Jun
Lupinus nanus		
Lupinus variicolor	Jul	Sep
Marah fabaceus	Jun	Sep
Melica californica	May	Jun
Mimulus aurantiacus	Jun	Nov
Monardella villosa	Jul	Sep
Nassella lepida	May	Jun
Nassella pulchra	Mar	Jun
Navarretia squarrosa	Aug	Nov
Phacelia californica	May	Sep
Phacelia distans	Jul	Sep
Phalaris californica	May	Jun
Plantago erecta	Apr	Jul
Polypodium californicum	Divisions	
Pteridium aquilinum var. pubescens	Divisions	
Rhamnus californica	May	Jun
Sanicula arctopoides	Mar	Jun
Sanicula bipinnatifida	May	Jul
Sanicula crassicaulis	May	Aug
Satureja douglasii	Jul	Sep
Scrophularia californica	May	Nov
Sidalcea malvaeflora	May	Jun
Sisyrinchium bellum	Jun	Sep
Solidago californica	Sep	Oct
Trifolium willdenovii	May	Jun
Trifolium wormskioldii	Jun	Jul
Triphysaria pusilla	Apr	Apr
Triteleia laxa	Jul	Oct
Viola adunca	May	May
Wyethia angustifolia	Jun	Jul