BOTANICAL SURVEY REPORT

NORTHERN REGIONAL LIBRARY FACILITY, PHASE IV
UNIVERSITY OF CALIFORNIA, BERKELEY (RICHMOND BAY CAMPUS)
RICHMOND FIELD STATION
RICHMOND, CA

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Revision 2

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1.0 INTRODUCTION

The Northern Regional Library Facility (NRLF) is located on the University of California, Berkeley Richmond Bay Campus (RBC), now referred to as UC Berkeley's Richmond Field Station. For the purposes of this study we refer to the site with its current name Richmond Field Station (RFS). The NRLF is a complex of buildings that store millions of low-use library materials. In order to meet increased storage demand, a new climate controlled building has been planned as an approximately 26,600 gross square-foot addition to the existing NRLF buildings. This proposed new Phase IV addition will store an additional 3.1 million volumes.

The existing NRLF and the proposed Phase IV development are situated immediately adjacent to an important occurrence of remnant coastal terrace prairie known as Big Meadow. Big Meadow has been evaluated and described in several previous technical reports prepared for the RFS and is also periodically studied by UC Berkeley students. The Richmond Bay Campus Coastal Terrace Prairie Management Plan (Management Plan) (Stromberg, 2014) was prepared in order to provide guidelines for protecting and restoring coastal prairie resources at the RFS in accordance with the goals of the University's 2014 Long Range Development Plan (LRDP) and the associated mitigation requirements of the LRDP Environmental Impact Report (Tetra Tech, 2014). The Management Plan identifies Big Meadow as one of the core coastal prairie areas at the RFS that is to be protected, enhanced, and monitored in the future. Additionally, the LRDP and EIR designate the majority of Big Meadow as a Natural Open Space.

Previous studies have used primarily qualitative methods to map the boundaries of the coastal prairie plant community, identified the locations of special status plant species within Big Meadow, and ranked the quality of relict coastal prairies at the RFS based on percent cover of California oat grass (*Danthonia californica*) and purple needlegrass (*Stipa pulchra*). The study completed by URS in 2007 also included the presence of six or more other plants ranked as "A" or "B" by the East Bay California Native Plant Society (EBCNPS) as part of the criteria for achieving a high quality ranking. Both the URS (2007) and Wildlife Research Associates (2013) studies identified Big Meadow as a "high quality" coastal prairie.

1.1 Purpose of Botanical Survey

The previous studies of Big Meadow referenced above as well as the more recent Detailed Project Program (DPP) for the NRLF Phase IV (EHDD, 2017) depict the location of the coastal prairie and its boundaries with respect to existing development. However, these coastal prairie boundary lines have been established by qualitative methods and are all slightly different from one another. In order to arrive at a more definite conclusion for where the edge of the coastal prairie within Big Meadow begins and its location relative to the proposed Phase IV NRLF footprint, U.C. Berkeley retained Rana Creek Habitat Restoration (Rana Creek) to perform a detailed survey of the northeastern edge of Big Meadow during May 2017.

This May 2017 survey included both a qualitative assessment as well as quantitative vegetation sampling within the areas of concern with the primary objective being to refine the location of the edge of the coastal prairie. The May 2017 survey supplements previous studies by URS and Wildlife Research Associates and also is applicable to mitigation measure LRDP MM BIO-5 of the EIR (Tetra Tech, 2014).

1. Note that previous studies and the 2014 Long Range Development Plan (LRDP) and Environmental Impact Report (EIR), which are still applicable to the site, use the name Richmond Bay Campus.

This mitigation measure requires the University to conduct a site-specific native plant survey prior to developing on any high, medium, or low quality grasslands outside of the Natural Open Space land use zone. The results of this survey are intended to inform the planning process for the NRLF Phase IV site as well as compensatory mitigation measures that may be required as a part of the project. Any future mitigation or enhancement of coastal prairie will need to be implemented in accordance with recommendations of the Management Plan.

1.2 Site and Survey Location

The NRLF at the RFS is located immediately south of Regatta Boulevard in the city of Richmond, Contra Costa County, California (**Map 1**). The site is bordered on the west and southwest sides by Big Meadow, while towards the south and east lies additional open space areas and assorted buildings associated with the RFS. Tidal marsh and the edge of San Francisco Bay lie approximately 0.6 kilometers towards the south. The botanical survey evaluated the area within the footprint of the proposed NRLF Phase IV development as well as an additional 45-meter buffer along the west and southern sides of the proposed development.

2.0 METHODS

2.1 Survey Date and Personnel

The botanical survey was performed on May 16, 2017 by Paul Kephart and John Wandke of Rana Creek. Conditions on the day of the survey were sunny to partly cloudy with a light breeze and temperatures in the mid 60's F. The survey was performed during the late spring in order to allow identification of as many species as possible during their flowering stage.

2.2 Qualitative Assessment

On the day of the survey, the northeastern quadrant of Big Meadow was traversed on foot and evaluated for the presence of several key coastal prairie indicator species, California oat grass and purple needlegrass, as well as other native grasses and forbs. The edge of the coastal prairie was visually located based on an approximate coverage of California oatgrass and/or purple needlegrass of 25 percent or greater. The approximate edge of coastal prairie was mapped as a polyline using a handheld Trimble GeoXH differential GPS unit. The GPS data was post-processed in the office and exported to the project GIS dataset in the California State Plane, Zone III, NAD83 coordinate system. During the qualitative assessment, a list of all native and non-native plant species found was compiled (**Appendix A**).

2.3 Quantitative Vegetation Sampling

In order to verify the boundary of the coastal prairie in the northeastern quadrant of Big Meadow, we performed sampling of ten 50-meter transects using the Daubenmire method for measuring vegetation canopy cover (Daubenmire, 1959). The Daubenmire method is used primarily for estimating cover in vegetation that is less than approximately waist high. Six of the 50-meter transects were placed systematically in an east-west orientation along the western edge of the proposed Phase IV development and four transects were placed systematically in a north-south orientation along the southern edge of the proposed development (**Map 2**), perpendicular to the development edge. The transects extended approximately 30 meters beyond the outer edge of the proposed development. The Daubenmire method was selected over other cover sampling methods, such as point-intercept sampling, so that the sampling detects a variety of species at each sampling location (i.e. quadrat) rather than a single species.

Since the primary purpose of the sampling was to detect the edge of the coastal prairie plant community and not necessarily to characterize its composition, transects were placed so that one end was situated within the ruderal conditions found adjacent to the existing buildings/pavement and the other end within coastal prairie of varying quality. This method is a deviation from the typical standard practice of vegetation sampling entirely within distinct plant communities and not allowing transects to cross from one community to another.

After transect layout we placed a 20cm by 50cm wire quadrat frame along each transect at 2.5-meter intervals for a total of 20 quadrats per transect. The wire quadrat is painted in order to aid visual estimation of canopy cover by species within six cover classes:

Cover Class	Range of Coverage	Midpoint of Range
1	0 – 5%	2.5%
2	5 – 25%	15.0%
3	25 – 50%	37.5%
4	50 – 75%	62.5%
5	75 – 95%	85.0%
6	95 – 100%	97.5%

Cover classes for each species observed within the quadrat were recorded on field forms and entered into a spreadsheet at the office. The data was used in order to located where on each transect coastal prairie species were first detected and what the combined *Danthonia* and *Stipa* coverage is by quadrat using the midpoint of range values. Average absolute cover across the entire transect for individual species can also be derived from the data, but is not as useful in this particular study because we intentionally sampled across two different communities (i.e. ruderal and coastal prairie).

3.0 FINDINGS

3.1 Plant Species Observed

At the time of the May 16, 2017 survey, many of the native and non-native perennial species within Big Meadow were at the peak of growth and flowering. The most abundant native perennial grass species found within coastal prairie in the survey area was California oatgrass, which occurs in a patchy distribution with absolute cover values locally as high as 85 percent. Purple needlegrass is the second most abundant native perennial grass, which often co-occurs with California oatgrass, and was found to have absolute cover values as high as 38 percent.

These observations are consistent with previous studies performed at Big Meadow by Wildlife Research Associates (2014) and URS (2007), which identified the vegetation alliances as primarily California oatgrass prairie or purple needlegrass grassland. These alliances are listed within the California Natural Diversity Database (CNDDB) maintained by the California Department of Fish & Wildlife (CDFW). California oatgrass was observed to the dominant native perennial grass and often co-occurs with purple needlegrass, the second most common native perennial grass. Other relatively common native species within the survey area include meadow barley (*Hordeum brachyantherum*), toad rush (*Juncus bufonius* var. *bufonius*), western rush (*Juncus occidentalis)* and blue eyed grass (*Sisyrinchium bellum*). Occasional occurrences of purple owl's clover (*Castilleja exserta* ssp. *exserta*), narrow mule's ear (*Wyethia angustifolia*), hairy gumplant (Grindelia *hirsutula* var. *hirsutula*), and brown-headed rush (*Juncus phaeocephalus* var. *phaeocephalus*) were also noted within the survey area.

Photo 1: 20cm x 50cm frame with dominant California oatgrass cover. Bristly ox-tongue and narrowleaf flax are also present

Photo 2: Narrow mule's ear

Although an occasional native species was observed within the ruderal areas adjacent to the NRLF buildings and pavement, most vegetation is non-native in the highly disturbed areas. The most prevalent non-native species is Harding grass (*Phalaris aquatica*), a large, tough perennial grass that thrives in moist conditions, such as those found at Big Meadow. Harding grass locally forms dense stands that occupy more than 90 percent absolute cover. The densest area of Harding grass was found along the east side of Big Meadow along Transects 2, 3, and 4. The Harding grass may extend further north, but the northern area of Big Meadow had been mowed shortly before the survey. These non-native species extend into the edges of Big Meadow and are also present within the higher quality areas, but at a much lesser density and coverage. Other very common non-native species include bristly ox-tongue (*Picris echioides*), rat tail fescue (*Festuca myuros),* and Italian ryegrass (*Festuca perennis*). The list of all native and non-native plant species observed during the survey is provided as **Appendix A**.

Photo 3: Harding grass forms a thick canopy along the western boundary of the proposed Phase IV development footprint.

Photo 4: View from within coastal prairie looking northeast towards existing Phase III buildings and the proposed Phase IV development area. California oatgrass and narrow mule's ear are visible in the foreground.

3.2 Boundary of Coastal Prairie

Observations collected during the May 2017 survey confirmed that the composition of the coastal prairie at Big Meadow is consistent with the *California oatgrass series* described by Sawyer and others (2009) and the corresponding Holland type of coastal terrace prairie (41100) listed by the CNDDB. The California oatgrass series is defined by dominance of California oatgrass, with a variety of other grasses and herbaceous plants being present, including purple needlegrass. This series is associated with wetland environments as well as coastal terraces, slopes, and ridges (Sawyer and others, 2009).

Although non-native plant species encroach upon the higher quality coastal prairie areas, the boundary between ruderal weedy vegetation and coastal prairie is relatively sharp. This distinct boundary allowed for effective visual determination of the coastal prairie boundary by GPS mapping. The GPS polyline created by visual mapping is shown on **Map 2** and follows the line dictated by quadrat sampling relatively closely.

The boundary line that is positioned on **Map 2** by the results of quadrat sampling along the transects follows the first occurrence of combined California oatgass and/or purple needlegrass cover within a single quadrat that falls within the Daubenmire cover class of 6 to 25 percent (Class 2). The midpoint of this cover class is 15.5 percent, which is near the midpoint of the "low quality" coastal prairie cover criteria (0-24% California oatgrass, 0-4% purple needlegrass) described by Wildlife Research Associates (2013).

The GPS boundary line created during the visual survey is a detailed representation of the path walked by the surveyor, since the GPS collects a data point at a one second interval. In contrast, the boundary line created by the transect/quadrat sampling data has points at quadrat locations only, which results in a more angular, lower resolution line. The visual boundary line is used to establish the edge of the coastal prairie, since it is more conservative and also picks up patches of coastal prairie along the edges of the occurrence that may have been missed by the sampling by random chance. The value of the transect/quadrat results is that they validate the visual observations with sample data and produce a boundary line that follows a path that is very similar to the average path of the visual boundary line.

4.0 DISCUSSION

Based on the findings of the May 2017 coastal prairie survey, a review of previous studies and the site layout for the proposed development, construction associated with the Phase IV NRLF development has the potential to impact the coastal prairie found in Big Meadow. Only a small area of 214 square meters (2,304 square feet) of coastal prairie detected by the visual survey lies within the footprint of the proposed development. However, the boundary of coastal prairie determined by both the visual survey and the sampling lies between approximately 4.5 meters (~15 feet) and 11.5 meters(~38 feet) beyond the edge of the development footprint. Based on a referenced construction buffer in the 2014 EIR (Tetra Tech, 2014) of 7.6 meters (25 feet), construction would impact approximately 214 square meters (2,304 square feet) of coastal prairie based on the qualitative estimate or 112 square meters (1,200 square feet) based on the quantitative sampling of transects. The extent of the larger area of the two is depicted on **Map 2**.

Unless a smaller construction buffer is possible, or the footprint of the proposed development can be altered, compensatory mitigation for loss of coastal prairie will need to be performed in accordance with mitigation measure LRDP MM BIO-5 of the EIR and the guidance provided in

the Management Plan. The areas estimated above are relatively small, however any future expansion of the facility in a westward or southerly direction would begin to cause additional substantial impacts on the coastal prairie resource.

5.0 RECOMMENDATIONS

Based on the results of the May 2017 survey, we recommend that the University prepare a project-specific mitigation plan for the NRLF Phase IV project. The plan should identify suitable coastal prairie restoration and enhancement sites on the RFS property that can be used to offset the impacts of this development.

6.0 REFERENCES

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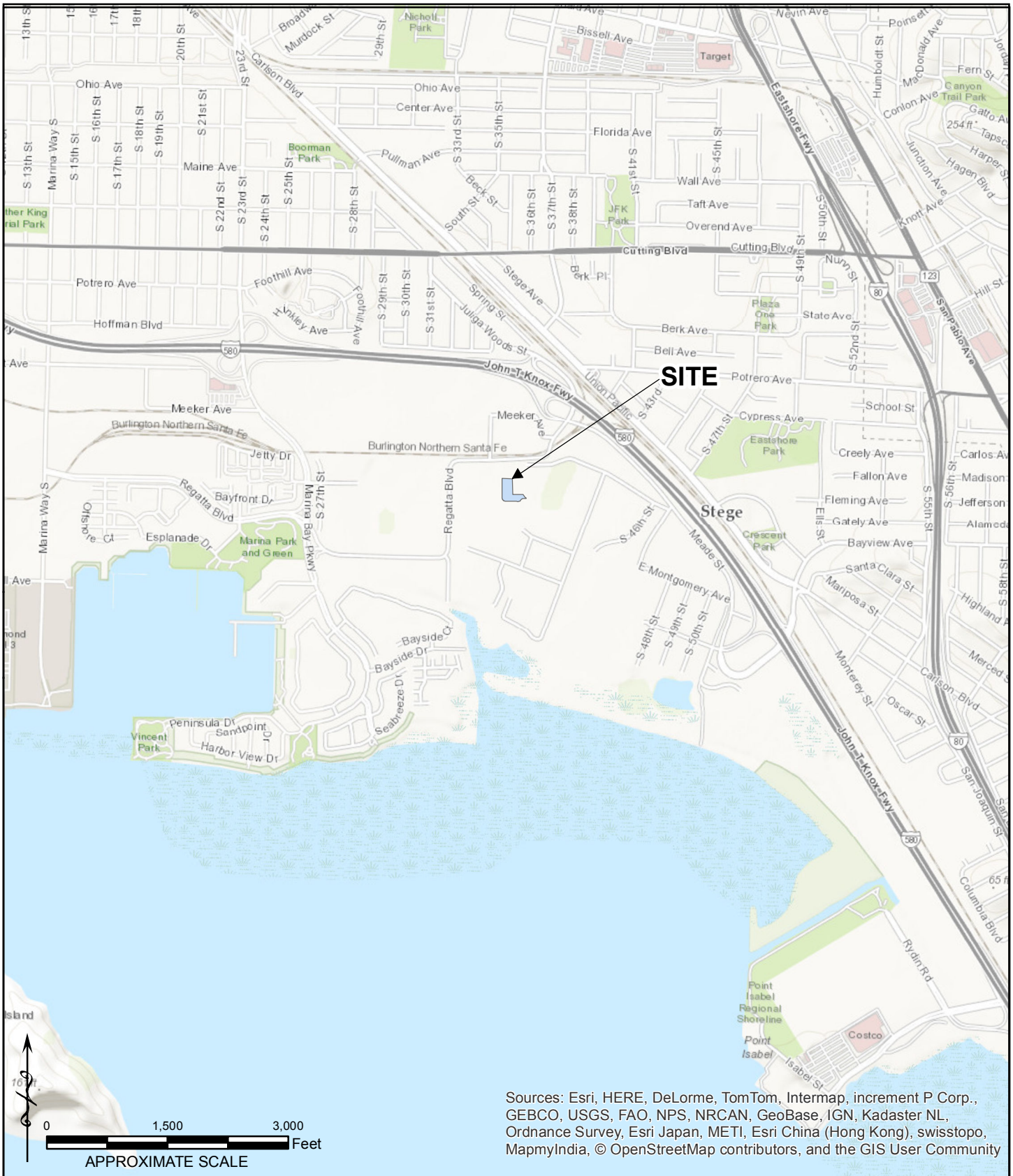
MAPS

MAP 1 VICINITY MAP

MAP 2 SITE PLAN AND SURVEY RESULTS



UC BERKELEY
RICHMOND FIELD STATION
NORTHERN REGIONAL
LIBRARY FACILITY
PHASE IV

JULY 2017
PREPARED BY: RANA CREEK
HABITAT RESTORATION

MAP 1
VICINITY MAP

REGATTA BOULEVARD

COVER SAMPLING TRANSECTS (1-10)

1

2

3

4

5

6

7

8

9

10

PHASE IV
VE OPTION

EXISTING NRLF BUILDINGS

FIRE TRUCK
TURNAROUND

BIG MEADOW

LEGEND

- DPP CT Prairie Boundary
- CT Prairie Sampling Boundary
- CT Prairie Visual Boundary

Combined Danthonia + Stipa Cover (%)

- 85.5
- 76
- 63
- 53.5
- 38
- 31
- 15.5
- 5
- 2.5
- 0
- Property Boundaries
- Impact Area Qualitative (25 ft buffer)

0 100 200 Feet

0 5 10 20 30 40 Meters

APPROXIMATE SCALE

State Plane CA III NAD83

NOTES:
1. SURVEY PERFORMED ON MAY 16, 2017
2. TRANSECTS 50 METERS
3. COVER SAMPLING METHOD: DAUBENMIRE, QUADRATS PLACED EVERY 2.5 METERS ALONG TRANSECTS
4. COMBINED DANTHONIA + STIPA COVER (15.5% AND GREATER DEPICTED IN 2.5-METER SEGMENTS

Document Path: L:\EnvPlan\3 ORDERS\UC Berkeley RBC Coastal Prairie\GIS\layouts\UCB_MAP2.mxd

rana creek

CONSULTANTS:

PROJECT TITLE:
UC BERKELEY
RICHMOND FIELD STATION
NORTHERN REGIONAL
LIBRARY FACILITY
PHASE IV

LOCATION:
RICHMOND
CONTRA COSTA COUNTY, CA

SHEET TITLE:

MAP 2
COASTAL TERRACE PRAIRIE
SURVEY RESULTS & EXTENTS

Imagery: April 2011
USGS

DATE: 2017.07.20

APPENDIX A

LIST OF PLANT SPECIES OBSERVED

Appendix A

U.C. Berkeley, Richmond Field Station
Plant Species List
May 16, 2017

Species Name	Common Name	Native
Aira caryophyllea	silver hairgrass	n
Anagallis arvensis	scarlet pimpernel	n
Avena barbata	slender wild oats	n
Baccharis pilularis	coyotebrush	y
Bellardia trixago	Mediterranean linseed	n
Briza minor	little rattlesnake grass	n
Bromus diandrus	ripgut brome	n
Bromus hordeaceus	soft chess brome	n
Camissonia ovata	sun cup	y
Castilleja exserta ssp. *exserta*	purple owl's clover	y
Cerastium glomeratum	mouse eared chickweed	n
Convolvulus arvensis	bindweed	n
Danthonia californica var. *californica*	California oatgrass	y
Dipsacus fullonum	teasel	n
Erodium cicutarium	red-stemmed filaree	n
Festuca myuros	rat tail fescue	n
Festuca perennis	Italian ryegrass	n
Foeniculum vulgare	sweet fennel	n
Geranium molle	dove's foot geranium	n
Grindelia hirsutula var. *hirsutula*	hairy gumplant	y
Hemizonia congesta	hayfield tarplant	y
Heteromeles arbutifolia	toyon	y
Hordeum brachyantherum	meadow barley	y
Hordeum murinum ssp. *leporinum*	foxtail barley	n
Hypochaeris glabra	smooth cat's ears	n
Hypochaeris radicata	hairy cat's-ears	n
Juncus bufonius var. *bufonius*	toad rush	y
Juncus occidentalis	western rush	y
Juncus phaeocephalus var. *phaeocephalus*	spreading brown-headed rush	y
Linum bienne	narrowleaf flax	n
Lotus corniculatus	bird's foot trefoil	n
Madia sativa	coast tarweed	y
Medicago polymorpha	bur clover	n
Phalaris aquatica	Harding grass	n
Picris echioides	bristly ox-tongue	n
Plantago lanceolata	English plantain	n
Poa annua	annual bluegrass	n
Ranunculus californicus	California buttercup	y
Rumex acetosella	sheep sorrel	n
Rumex crispus	curly dock	n
Sisyrinchium bellum	blue-eyed grass	y
Sonchus asper	prickly sow thistle	n
Sonchus oleraceus	common sow thistle	n
Stipa pulchra	purple needlegrass	y
Tragopogon porrifolius	salsify	n
Trifolium dubium	hop clover	n
Triteleia hyacinthina	white brodiaea	y
Vicia sativa ssp. *sativa*	spring vetch	n
Wyethia angustifolia	narrow mule's ear	y