
Biological Resources Inventory

WETLAND RESTORATION DESIGN AND PERMITTING SUPPORT
SERVICES AT CORTE MADERA ECOLOGICAL RESERVE

CORTE MADERA, MARIN COUNTY, CALIFORNIA

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LIST OF ABBREVIATIONS AND ACRONYMS

401	Section 401 of the Clean Water Act
404	Section 404 of the Clean Water Act
1600	Section 1600 of the California Fish and Game Code
Cal-IPC	California Invasive Plant Council
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife (formerly the CDFG)
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	United States Army Corps of Engineers
CSRL	California Soil Resources Laboratory
EDR	Environmental Data Resources Inc.
Estuary	San Francisco Bay Estuary
SMART	Sonoma Marin Area Rail Transit
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Service
WRA	WRA, Inc.

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1.0 INTRODUCTION

The Golden Gate Bridge, Highway and Transportation District (GGBHTD) retained WRA, Inc. (WRA) to conduct a biological resources inventory of its approximately 72-acre parcel in Corte Madera, California (Study Area, Figure 1). In support of the proposed restoration efforts, WRA conducted a biological resources inventory over several dates including July 15 and 29, August 13, and September 11, 2014, of the Study Area located adjacent to the California Department of Fish and Wildlife (CDFW) Corte Madera Marsh Ecological Reserve (CMMER) in Marin County, California (Figure 1). This report provides background information related to the Study Area and describes the methods and results of the inventory. The report also provides recommendations for future restoration and management activities within the Study Area.

2.0 BACKGROUND AND SETTING

The Study Area, shown on Figure 2, includes an approximately 72-acre parcel owned by the GGBHTD and adjacent lands, which are under consideration for restoration in support of federally listed species such as the California clapper rail (*Rallus longirostris obsoletus*; Federal Endangered) and salt marsh harvest mouse (*Reithrodontomys raviventris*; Federal Endangered). The Study Area is approximately 96 acres in extent and includes the entirety of the 72.4-acre subject parcel owned by the GGBHTD as well as adjacent lands that may be included in the proposed restoration efforts. For example, at the eastern edge of the subject parcel, the Study Area was extended beyond the parcel boundary to include tidal channels that may be used to restore tidal hydrology to the subject parcel. The majority of the Study Area (approximately 65 acres) occurs inboard of a perimeter levee, which separates a large, central portion of the Study Area from tidal activity. The discussion presented in this report focuses primarily on this diked portion of the Study Area, which includes the majority of the parcel owned by the GGBHTD.

2.1 Location

The Study Area is located within the limits of the Town of Corte Madera, approximately 0.25 mile east of Highway 101 and 0.60 mile south of Sir Francis Drake Boulevard (Figures 1 and 2). The Study Area is bordered by tidal salt marsh of the CMMER on three sides: to the north by Heerdt Marsh, to the east by North Muzzi Marsh, to the south by Muzzi Marsh. The Study Area is bordered to the west by the Sonoma Marin Area Rail Transit (SMART) right-of-way and by Shorebird Marsh. The southern tip of the Study Area is bordered to the west by commercial development of the Town of Corte Madera.

2.2 Land Use History

The Study Area is a diked former bayland along the margins of San Francisco Bay, a portion of which has been returned to tidal activity. Based on a review of historic aerial photographs, it was determined that the tidal salt marsh adjacent to and including the Study Area was diked and reconfigured starting in the 1950s, with man-made levees disrupting tidal influence to the baylands. In the 1970s, an inner set of dikes was constructed around an approximately 65-acre portion of the Study Area and tidal activity was returned to portions of the marsh to the north, east, and south of the Study Area. Over time, elevations within the diked portion of the Study Area subsided, resulting in the mix of seasonal wetlands and ruderal uplands that exists today. The Study Area contains limited evidence of past development, including: 1) formal public access trails along the southern and eastern levees, with informal public access trails along the western and northern levees and throughout several portions of the Study Area; 2) three



Figure 1. Study Area Location Map

Wetland Restoration Design and Permitting Support
 Services at Corte Madera Ecological Reserve
 Town of Corte Madera, Marin County, California

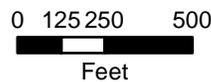


Map Prepared Date: 8/28/2015
 Map Prepared By: pkobylarz
 Base Source: Esri, National Geographic
 Data Source(s): WRA



Figure 2. Study Area Overview

Wetland Restoration Design and Permitting Support
 Services at Corte Madera Ecological Reserve
 Town of Corte Madera, Marin County, California



Map Prepared Date: 8/28/2015
 Map Prepared By: pkobylarz
 Base Source: Marin County 4/20/2011
 Data Source(s): WRA

unmaintained drainage culverts at the southern end of the Study Area, inboard of the perimeter levee; and 3) electric transmission lines running along the eastern edge of the Study Area.

2.3 Current Conditions

The lands within the Study Area to the east and south (i.e., outboard) of the perimeter levee surrounding the subject parcel were returned to tidal activity in 1976. These areas currently support healthy stands of native tidal salt marsh vegetation. This tidal salt marsh habitat is now part of the CMMER. Most portions of the subject parcel remain disconnected from tidal activity by the perimeter levee. An unimproved pedestrian trail occurs on top of the levee along the northern, eastern, and southern margins of the Study Area, and a number of additional informal trails cross the interior of the Study Area. A public access easement is located along a portion of the perimeter of the site. The easement includes the southern and eastern portions of the levee but does not include the northern levee or the west side of the parcel. The western levee is part of the SMART railroad right-of-way and is located outside of the subject parcel boundary.

The interior of the Study Area (i.e., inboard of the perimeter levee) contains a mix of highly disturbed habitat, including upland and wetland areas. Most of the plant communities on the Study Area, including seasonal wetland plant communities, are dominated by non-native, invasive plant species and are of relatively low quality for wildlife. The Study Area has historically contained a number of homeless encampments; however, these were removed during site maintenance in October 2014. In addition to disturbance from homeless encampments, the site is regularly accessed by the public for passive recreational activities such as dog walking and jogging. Many dogs were observed to be off leash during the site assessments conducted for this survey. The presence of off-leash dogs reduces the quality of habitat at the site for native wildlife species.

In January 2014, a fire occurred near the center of the Study Area. In addition to disturbance from the fire itself, subsequent fire control efforts created substantial vegetation and ground disturbance in these areas. As part of the fire control efforts, mounds of pampas grass (*Cortaderia jubata*) were uprooted and placed on the ground surface in an adjacent area, leaving a patchwork of partially burned, uprooted pampas grass mounds and depressions where the plants were once rooted. A smaller area in the northeastern portion of the Study Area appears to have burned around the same time; however, there was less apparent disturbance in these areas, with only a few pampas grass mounds having been uprooted. Most pampas grass mounds in this area were only partially burned and many were sending out new shoots. Without active weed control efforts, it is likely that these areas will return to being dominated by pampas grass in the near future. In October 2014, goats were used to remove the aboveground portions of pampas grass and other weedy species within the Study Area.

2.4 Climate and Weather

The Study Area is located along the margin of the San Francisco Bay and east of the Marin Hills of the Pacific Coast Ranges. The local climate features mild, wet, nearly frostless winters and cool summers with frequent fog and wind. During the summer, fog rolls into this climactic zone high and fast, creating a cooling and humidifying layer that regulates the intensity of light and heat. Summers usually experience highs from 60 to 75 degrees Fahrenheit (Brenzel 2007). The average daily maximum temperature at the National Climate Data Center's (NCDC) weather station in nearby Kentfield (NCDC Station 44500), approximately 2 miles northwest of the Study Area, is 69.8 degrees Fahrenheit; the average daily minimum temperature is 47.6 degrees Fahrenheit (U.S. Department of Agriculture [USDA] 2014a). The warmest months are May through October, with daily maximum temperatures during these months averaging

between 73.5 and 82.7 degrees Fahrenheit. The coolest months are November through March, with daily minimum temperatures averaging between 41.3 and 45.3 degrees Fahrenheit. Precipitation occurs exclusively as fog drip and rainfall, with long-term average annual precipitation of approximately 50 inches. Rain-bearing weather systems come predominantly from the west.

2.5 Topography and Soils

Elevations within the Study Area reach a low of approximately 5 feet above sea level (NAVD88) within the marsh plain along the eastern and northern edges of the Study Area and reach a high of approximately 11 feet above sea level (NAVD88) in the northern portion of the Study Area. Topography generally slopes from the north to south within the Study Area, with minor topographic variability in the northern portion and a uniform, flat area in the southern portion. The southern portion of the Study Area, inboard of the perimeter levees, contains elevations consistent with elevations of the tidal marsh habitat located outboard of the levees. Therefore, minimal cut and fill will be necessary to the southern portion of the Study Area, where elevations are currently suitable to support tidal habitat. The Soil Survey of Marin County (USDA 2013) and SoilWeb (California Soil Resources Lab [CSRL] 2014) indicate that the Study Area contains two soil map units: *Blucher-Cole complex, 2 to 5 percent slopes* (8.5 percent of the Study Area) and *Xerorthents, fill* (91.5 percent of the Study Area). These soil map units are described in detail below; the distribution of these soil map units within the Study Area is shown on Figure 3.

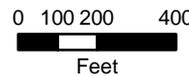
Blucher-Cole complex, 2 to 5 percent slopes. The *Blucher series* is mapped along the northern portion of the Study Area and (USDA 2014a) consists of deep, somewhat poorly drained soils that formed in alluvium from mixed sources, occurring in basins and on alluvial fans. Blucher soils consist of fine-loamy, mixed substrates with slow runoff and moderate to slow permeability. A representative profile for this series, as described by the USDA, consists of grayish brown (10YR 5/2) silt loam to 7 inches with very dark grayish brown (10YR 3/2) and many fine faint strong brown (7.5YR 5/6) mottles. This is underlain by brown (10YR 5/3) loam with very dark grayish brown (10YR 3/2), and few fine faint yellowish brown (10YR 5/4) mottles to 16 inches. The Blucher series is listed on the U.S. national hydric soils list (USDA 2014b). The *Cole series* (USDA 2014a) consists of very deep, somewhat poorly drained soils that formed in alluvium from mixed sources on river terraces, basins, flood plains, or on alluvial fans with slopes of 0 to 5 percent. Cole soils consist of poorly drained clay loams with slow runoff and slow permeability. A representative profile for this series, as described by the USDA, consists of plow layer of grayish brown (10YR 5/2) clay loam to 6 inches underlain by grayish brown (10YR 5/2) clay loam argillic layer to 13 inches. This is underlain by a gray (10YR 5/1) clay loam layer to 35 inches.

Xerorthents, fill. Xerorthents are mapped throughout the Study Area, and are (generally) deep, poorly developed soils of Mediterranean climates, usually associated with erosional surfaces, both natural and anthropogenic. In this case, the soils were deposited on the site from human activities. Xerorthents occur with a range of moisture and temperature regimes and lack well defined diagnostic horizons. This soil map unit is mapped throughout the southern portion of the Study Area, including all areas inboard of the perimeter levee, and corresponds to the area of Bay dredge spoils that were deposited on the site. Based on historic aerial imagery (Environmental Data Resources Inc. [EDR] 2014), the Study Area received Bay dredge spoils starting in the 1950s from other sources and around 1970, was purchased by GGBHTD, which used it as a deposit area for soil and sediment dredged from the new Larkspur ferry landing slip and navigational channel (Marin Audubon Society 2014).



Figure 3. Soils within Study Area

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 Town of Cortes Madera, Marin County, California



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 Map Prepared By: pkobylarz
 Base Source: Marin County 4/20/2011
 Data Source(s): WRA

Within the Study Area, these soils contained a thin organic layer (0 to 1 inch thick) underlain by platy, dark grey (2.5Y 4/1) soils with loamy clay to clay textures. Soils contained common to many, fine to medium, dark brown (7.5YR 3/4) mottles occurring as concentrations in the matrix, along pore linings and root channels, and along natural breaks in the soil profile (i.e., ped faces).

3.0 SITE ASSESSMENT

3.1 Methods

3.1.1 Literature Review

Prior to the site visit, reference materials were reviewed, including the Soil Survey of Marin County (USDA 2013), online soil data (CSRL 2014), U.S. Geological Survey (USGS) 7.5-minute maps for the San Rafael quadrangle (2012), and current and historic aerial photographs of the Study Area (Google Earth 2014). These materials were reviewed to determine whether any unique soil types or other features capable of supporting special-status plant species, sensitive plant communities, and/or aquatic features were present on the Study Area. Database searches were conducted for known occurrences of special-status plant and wildlife species focused on the San Rafael, San Quentin, Novato, Petaluma Point, Point Bonita, and San Francisco North USGS 7.5-minute quadrangles.

The following sources were reviewed to determine which special-status plant and wildlife species have been documented from the vicinity of the Study Area:

- California Natural Diversity Database (CNDDDB) records (California Department of Fish and Wildlife [CDFW] 2014)
- California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (2014a)
- USFWS species lists (2014b)
- CDFW Natural Communities List (California Department of Fish and Game [CDFG] 2010)
- CDFW publication “California’s Wildlife, Volumes I-III” (Zeiner et al. 1990)
- CDFW and Western Field Ornithologists publication “California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California” (Shuford and Gardali 2008)
- CDFW publication “Amphibians and Reptile Species of Special Concern in California” (Jennings and Hayes 1994)
- “A Field Guide to Western Reptiles and Amphibians” (Stebbins 2003)
- “California Clapper Rail Surveys for the San Francisco Estuary Invasive Spartina Project 2013” (Olofson Environmental 2013)

Other primary and secondary literature sources (including internet websites) containing biological and distributional information for individual special-status species reviewed are cited in subsequent sections.

3.1.2 Fieldwork

Prior to all field studies, WRA generated field maps at a scale (1:50 to 1:200) sufficient to identify and hand draw distinct features on the landscape (e.g., vegetation shifts, individual trees, rock outcrops). Field maps contained a recent (2011), high-resolution aerial photograph supplied by the County of Marin. The aerial imagery was of sufficient resolution to allow biological communities and other distinct features to be mapped by hand.

WRA biologists surveyed the Study Area on-foot during several occasions July 15 and 29, August 13, and September 11, 2014, to document biological communities found on the site, including an assessment of their conditions and their suitability for hosting special-status species (discussed in Section 3.3). Biological communities were identified in the field and divided into sensitive and non-sensitive communities. Sensitive biological communities were classified as those communities afforded special consideration under the California Environmental Quality Act (CEQA), all vegetation alliances with a State (“S”) ranking of S1 through S3, communities designated with an asterisk (*) by Holland (1986) or on the CDFW natural communities list (CDFG 2010), and communities considered jurisdictional under Sections 404 or 401 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, and/or Section 1600 of the California Fish and Game Code. Non-sensitive biological communities were classified as those not afforded special consideration under the CEQA or other federal, state, or local laws, regulations, or ordinances.

Plant communities are classified based on a hierarchical structure similar to that of plant or wildlife species (i.e., Domain, Kingdom, Phylum, Class, Order, Family, Genus, Species). Plant communities were classified based on existing descriptions (Holland 1986) which are based on habitat position, community structure, and generalized species composition. Plant communities were refined to the vegetation alliance level following Sawyer et al. 2009; vegetation alliances represent one of the lowest levels of plant community classification based on dominant species within the community. However, in some cases it was necessary to identify variants of vegetation alliances and un-described associations. Plant nomenclature follows Baldwin et al. (2012) and subsequent revisions by the Jepson Flora Project (2014), except where noted. For cases in which regulatory agencies, the CNPS, or other entities base rarity on older taxonomic treatments, precedence was given to the treatment used by those entities.

3.2 Biological Communities

Three communities described by Holland (1986) were observed during the 2014 assessment of the Study Area: northern coastal salt marsh, northern coyote brush scrub, and non-native grassland. Additional communities not described by Holland but observed within the Study Area included non-native woodland, non-native shrubland, non-native herbaceous stands, and seasonal wetlands. Within these communities, eleven vegetation alliances described by Sawyer et al. (2009) were observed (Table 2), including: coyote brush scrub, French broom patches, saltgrass flats, pickleweed mats, fields of fat hen and brassbuttons, salt marsh bulrush marshes, , pampas grass patches, fennel patches, annual brome grasslands, harding grass swards, and perennial rye grass fields. Two plant communities were observed on the Study Area that are not described by Holland (1986) or Sawyer et al (2009), including an herbaceous seasonal wetland community dominated by curly dock (*Rumex crispus*) and a woodland

community dominated by silver wattle (*Acacia dealbata*) and blackwood acacia (*A. melanoxylon*). In addition, the Study Area contains portions of one or more tidal channels, which are considered sensitive. The pedestrian trail running along the perimeter levee was classified as a developed/disturbed landcover type; developed/disturbed areas are not considered sensitive.

The biological communities observed on the Study Area are described below, summarized in Tables 1 and 2, and shown on Figure 4.

Table 1. Overview of biological communities observed on the Study Area and within the subject parcel

Biological Community	Sensitivity	Acres within Study Area	Acres within Subject Parcel
Woodland	Non-sensitive	4.66	3.23
Shrubland	Non-sensitive	5.42	5.32
Herbaceous	Sensitive	42.62	24.42
	Non-sensitive	38.71	35.67
Other	Open water (sensitive)	2.98	1.94
	Disturbed/developed (non-sensitive)	1.91	1.74
Total (Sensitive)		45.6	28.1
Total (Non-Sensitive)		50.7	44.2
Total (Sensitive + Non-Sensitive)		96.3	72.3

3.2.1 Wetlands and Non-Wetland Waters

The Study Area contains sensitive and non-sensitive herbaceous wetland communities comprising four vegetation alliances. The Study Area also contains non-wetland waters consisting of parts of one or more tidal channels. These biological communities are described below. Additional information on wetlands and non-wetland waters found on the Study Area can be found in the Jurisdictional Delineation Report prepared by WRA (2014).

Northern Coastal Salt Marsh

Northern coastal salt marsh is a community typically found along sheltered margins of bays, lagoons, and estuaries, where tidal inundation of salt water occurs (Holland 1986). This highly productive herbaceous and suffrutescent biological community is composed of salt-tolerant hydrophytes forming moderate to dense cover. Two herbaceous alliances corresponding to Holland's northern coastal salt marsh exist within the Study Area: saltgrass flats and pickleweed mats. These alliances are described below.

Table 2. Biological communities observed on the Study Area

Vegetation Structure	Community (Holland 1986)	Vegetation Alliance (Sawyer et al 2009)	Sensitive?	Rarity Ranking	Acres within Study Area	Acres within Subject Parcel
Tree dominated	Non-native woodland ¹	Acacia woodland (<i>Acacia dealbata</i> and <i>A. melanoxylon</i> Semi-Natural Woodland Stands) ¹	No	N/A	4.66	3.23
Shrub dominated	Northern coyote brush scrub	Coyote brush scrub (<i>Baccharis pilularis</i> Shrubland Alliance)	No	G5 S5	5.01	5.01
	Non-native shrubland ¹	French broom patches (<i>Genista monspessulana</i> Semi-Natural Shrubland Stands)	No	N/A	0.41	0.31
Herb dominated	Northern coastal salt marsh	Saltgrass flats (<i>Distichlis spicata</i> Herbaceous Alliance)	Yes	G5 S4	0.77	0.48
		Pickleweed mats (<i>Salicornia pacifica</i> Herbaceous Alliance) – Tidal	Yes	G4 S3	21.32	3.73
	Seasonal wetlands ¹	Fields of fat hen and brassbuttons (<i>Atriplex prostrata</i> - <i>Cotula coronopifolia</i> Semi-Natural Herbaceous Stands)	No ²	N/A	12.96	12.94
		Salt marsh bulrush marshes (<i>Bolboschoenus maritimus</i> Herbaceous Alliance, Rarity Ranking G4 S3)	Yes	G4 S3	0.31	0.31
		Curly Dock seasonal wetlands (<i>Rumex crispus</i> Semi-Natural Herbaceous Stands) ¹	No ²	N/A	1.49	1.49

Vegetation Structure	Community (Holland 1986)	Vegetation Alliance (Sawyer et al 2009)	Sensitive?	Rarity Ranking	Acres within Study Area	Acres within Subject Parcel
Herb dominated	Seasonal wetlands ¹	Pickleweed mats (<i>Salicornia pacifica</i> Herbaceous Alliance) – Non-Tidal	Yes	G4 S3	5.77	5.47
	Non-native grasslands	Annual brome grasslands (<i>Bromus diandrus</i> , <i>B. hordeaceus</i> Semi-Natural Herbaceous Stands) Harding grass swards (<i>Phalaris aquatica</i> Semi-Natural Herbaceous Stands) Perennial rye grass fields (<i>Lolium perenne</i> Semi-Natural Herbaceous Stands)	No	N/A	20.80	19.37
	Non-native herbaceous stands ¹	Pampas grass patches (<i>Cortaderia jubata</i> Semi-Natural Herbaceous Stands)	No	N/A	12.02	11.90
		Fennel patches (<i>Foeniculum vulgare</i> Semi-Natural Herbaceous Stands)	No	N/A	5.89	4.40
Open water	Tidal and subtidal channels	N/A	Yes	N/A	2.98	1.94
Developed	Formal and informal trails	N/A	No	N/A	1.91	1.74

¹Community or alliance not described by Holland (1986) and/or Sawyer et al. (2009); described by WRA following the format used by those authors.

²This plant community is not considered rare in California or globally; however, because it occurs in wetland positions, it may be considered sensitive by some agencies.

Saltgrass Flats (*Distichlis spicata* Herbaceous Alliance). Approximately 0.77 acre of saltgrass flats (Photograph D.14, Appendix D) exist in the tidally influenced areas along the outer perimeter of the Study Area, above the elevation of pickleweed mats. Of this area, approximately 0.48 acre of saltgrass flats exists within the Subject Parcel. Saltgrass flats are dominated by saltgrass, a native perennial forb that occurs throughout the state of California in coastal salt marshes, playas, swales, and terraces along intermittently flooded washes (Sawyer 2009). Co-dominant herbs include species such as pickleweed (*Salicornia pacifica*), alkali sea heath (*Frankenia salina*), common brassbuttons (*Cotula coronopifolia*), riggut brome (*Bromus diandrus*), and fat hen (*Atriplex prostrata*). Saltgrass flats have a sensitivity ranking of G5 S4 (Sawyer 2009), indicating that the alliance is considered demonstrably secure globally and apparently secure in California (CDFW 2014; NatureServe 2014). Within the Study Area, this community generally satisfied the U.S. Army Corps of Engineers (Corps) three-parameter wetland definition, making it subject to regulation by the Corps and the San Francisco Regional Water Quality Control Board (RWQCB). When it occurs in wetland habitats, this vegetation alliance would be considered sensitive under the CEQA.

Pickleweed Mats (*Salicornia pacifica* Herbaceous Alliance) – Tidal. This vegetation alliance occurs along coastal salt marshes and in alkaline flats along the San Francisco Bay, in the Great Valley and generally in coastal areas of California at elevations up to approximately 8 feet above sea level (Sawyer 2009). Within the Study Area, approximately 21.32 acres (of pickleweed mats occur along the outer perimeter, in areas of tidal influence from Corte Madera Bay, of which 3.73 acres occur within Subject Parcel (Photograph D.14, Appendix D). In addition, within the Study Area, 5.77 acres of non-tidal pickleweed mats occur within the seasonal wetland habitat inboard of the levee, of which 5.47 acres of non-tidal pickleweed mats occur within the Subject Parcel (described below). Sawyer et al. (2009) describe pickleweed mats as an alliance with plants ranging up to 5 feet in height, dominated or co-dominated by pickleweed with other species typical of coastal salt marsh habitats such as fat hen, alkali sea heath, and Oregon gumweed (*Grindelia stricta*). Pickleweed mats have a rarity ranking of G4 S3 (Sawyer 2009), indicating that the alliance is considered apparently secure globally but vulnerable in California (CDFW 2014; NatureServe 2014). This community is protected by the CDFW as a sensitive plant community. This community is also regulated by the Corps and the RWQCB as wetland habitat. Pickleweed mats would be considered sensitive under the CEQA.

Seasonal Wetlands

Seasonal wetlands are not described by Holland (1986). Seasonal wetland plant communities occur in swales and depressions that are ponded during the rainy season for sufficient duration to support vegetation adapted to wetland conditions. Seasonal wetlands in California are highly variable in plant composition, depending on the length of ponding or inundation and other factors such as soil salinity. They also generally lack the plant community assemblage typical of defined marshes and vernal pools. Seasonal wetlands occurred on the Study Area inboard of the perimeter levee and were largely dominated by salt tolerant and/or halophytic species, presumably due to residual salinity in the soils at the site. All existing seasonal wetlands within the Study Area formed only after the tidal salt marsh in this area was isolated from tidal influence by the perimeter levee and the ground surface was elevated through the placement of dredged materials. The existing seasonal wetlands on the site developed in places where this dredged material has subsided. Four seasonal wetland plant communities were observed on the Study Area: fields of fat hen and brass buttons, salt marsh bulrush marshes, curly dock seasonal wetlands, and pickleweed mats (non-tidal). These vegetation alliances are described below.

Biological Community	Acres within Study Area	Acres within Parcel
Sensitive Communities		
Curly dock seasonal wetlands	1.49	1.49
Fields of fat hen and brassbuttons	12.96	12.94
Pickleweed mats (non-tidal)	5.77	5.47
Salt marsh bulrush marshes	0.31	0.31
Pickleweed mats (tidal)	21.32	3.73
Saltgrass flats	0.77	0.48
Open water	2.98	1.94
Non-Sensitive Communities		
Acacia woodland	4.66	3.23
Coyote brush scrub	5.01	5.01
Fennel patches	5.89	4.40
French broom patches	0.41	0.31
Non-native grassland	20.80	19.37
Pampas grass patches	12.02	11.90
Developed	1.91	1.74

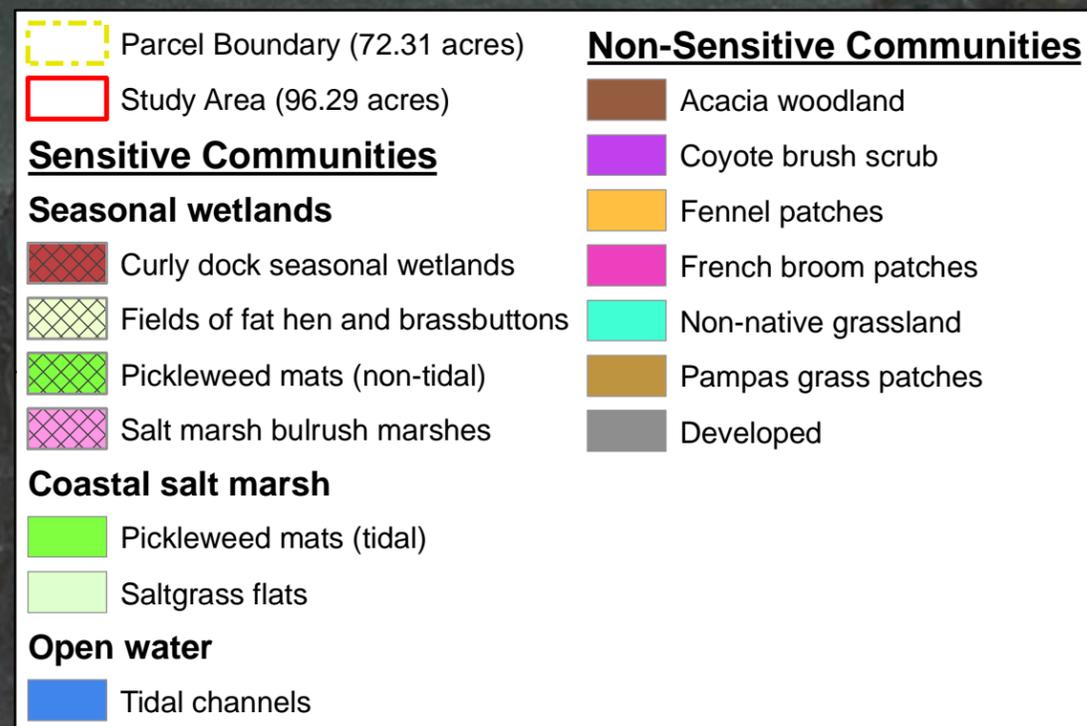
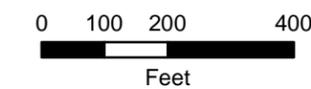
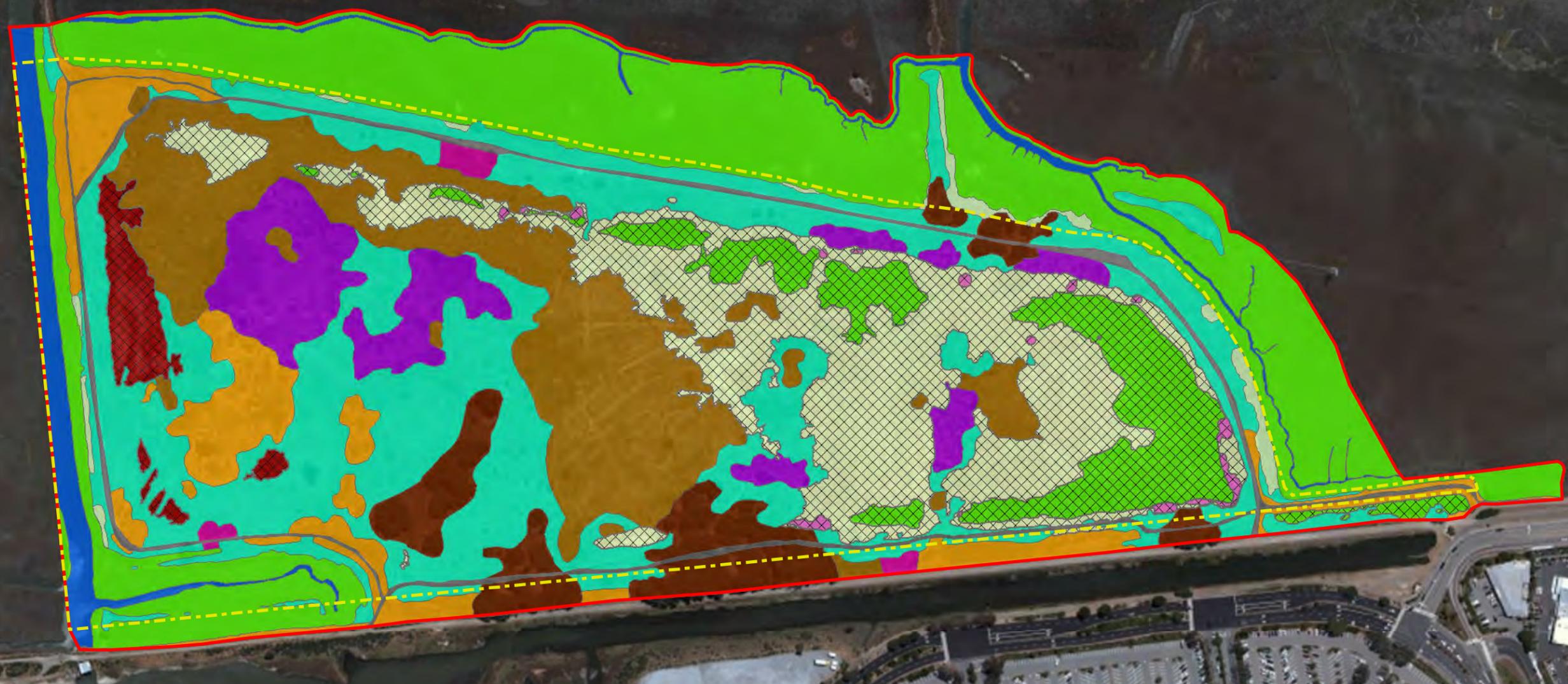


Figure 4.
Biological Communities
within the
Study Area



Map Prepared Date: 8/28/2015
Map Prepared By: pkobylarz
Base Source: Marin County 4/20/2011
Data Source(s): WRA

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Fields of Fat Hen and Brassbuttons (*Atriplex prostrata*-*Cotula coronopifolia* Semi-Natural Herbaceous Stands). Approximately 12.96 acres of seasonal wetland habitat dominated by fat hen and common brassbuttons were observed on the Study Area, of which, 12.94 acres occur within the Subject Parcel (Photographs D.6-7, Appendix D). Sawyer et al. (2009) describe this community as typically found in seasonally flooded saline mudflats or brackish marshes with alluvium soils at elevations ranging from sea level to approximately 990 feet above sea level. Herbs can reach as tall as approximately 3 feet, with intermittent to continuous canopy. Fields of fat hen and brassbuttons generally do not contain high cover of native plant species, and brassbuttons has been evaluated by California Invasive Plant Council (Cal-IPC) as having “limited” potential for invasiveness (2014). While this alliance has no rarity ranking, within the Study Area, fields of fat hen and brassbuttons occur within seasonal wetland habitat and are thus regulated by the Corps and the RWQCB and would be considered sensitive under the CEQA.

Salt Marsh Bulrush Marshes (*Bolboschoenus maritimus* Herbaceous Alliance). Approximately 0.31 acre of salt marsh bulrush marshes are scattered throughout the central and southern portions of the interior of the Study Area, all of which occur within the Subject Parcel (Photograph D.11, Appendix D). Salt marsh bulrush marshes are described by Sawyer et al. (2009) as typically habituating on seasonally flooded mudflats and tidal brackish marshes throughout low-elevation areas. Salt marsh bulrush marshes reach up to 5 feet in stature and generally have intermittent to continuous canopy cover (Sawyer 2009). Within the Study Area, salt marsh bulrush occurred within the brackish seasonal wetland habitat located inboard of the perimeter levee. Salt marsh bulrush marshes have a sensitivity ranking of G4 S3, indicating that the community is considered apparently secure globally but vulnerable in California (CDFW 2014; NatureServe 2014). Additionally, this community is protected as wetland habitat and is regulated by the Corps and the RWQCB. Salt marsh bulrush marshes would considered sensitive under the CEQA.

Curly Dock Seasonal Wetlands (*Rumex crispus* Semi-Natural Herbaceous Stands). Approximately 1.49 acres of seasonal wetland habitat dominated by curly dock was observed in the northern portion of the Study Area, all of which occur within the Subject Parcel (Photograph D.4, Appendix D). Curly dock seasonal wetlands are not described by Holland (1986) or Sawyer et al. (2009) and are not recognized by the CDFW. However, seasonal wetlands dominated by curly dock are common throughout California. This plant community does not have a sensitivity ranking and is not considered a sensitive natural community by the CDFW. However, because this community occurs exclusively within wetlands where it occurs in the Study Area, it will be regulated by the Corps and the RWQCB as wetland habitat. Wetlands are considered sensitive under the CEQA, and therefore, this community has been considered sensitive in this report.

Pickleweed Mats (*Salicornia pacifica* Herbaceous Alliance) – Non-Tidal. Approximately 5.77 acres of non-tidal pickleweed mats are located in seasonal wetland habitat located inboard of the perimeter levee in the Study Area, of which 5.47 acres occur within the Subject Parcel (Photograph D.8, Appendix D). These wetlands are assumed to be brackish due to the presence of saline dredge spoils. The non-tidal pickleweed mats within the interior of the Study Area were similar to the tidally influenced pickleweed mats occurring outboard of the perimeter levee, as described above for northern coastal salt marsh. As described above, pickleweed mats, when they occur in wetlands, are regulated by the Corps and the RWQCB and would be considered sensitive under the CEQA.

Open Water

Tidal and Subtidal Channels. Tidal and subtidal channels are not described by Holland (1986) or Sawyer et al. (2009). Tidal channels occur in coastal zones and have a direct hydrologic connection to tidal waters and are subject to daily tidal fluctuations. Subtidal channels occur at a lower elevation and are permanently flooded. Approximately 2.98 acres of tidal and subtidal channels occur in the northern and southern portions of the Study Area, of which 1.94 acres occur within the Subject Parcel (Photographs D.1 and D.2, Appendix D). These channels are fully tidal and ultimately drain to the San Francisco Bay and are regulated by the Corps, the RWQCB, and potentially the CDFW. They are also considered sensitive under the CEQA.

3.2.2 Sensitive Terrestrial Communities

The Study Area did not contain any sensitive terrestrial communities. Plant communities which occurred in wetlands were classified as non-terrestrial communities (i.e., wetlands and non-wetland waters, described in Section 3.2.1) and are therefore not included here as sensitive terrestrial communities.

3.2.3 Non-Sensitive Terrestrial Communities

The Study Area contained non-sensitive terrestrial communities comprising five terrestrial community types. These terrestrial community types are described below and are illustrated on Figure 4.

Tree-Dominated Communities

Acacia Woodland (*Acacia dealbata* and *A. melanoxylon* Semi-Natural Woodland Stands). The Study Area contains approximately 4.66 acres (of which 3.23 acres occur within the Subject Parcel) of acacia woodland along the western perimeter that was dominated by silver wattle (*Acacia dealbata*) and blackwood acacia (*A. melanoxylon*) (Photograph D.9, Appendix D). Sawyer et al. (2009) and Holland (1986) do not describe respective communities. Both acacia species within this woodland community are non-native to California and have been rated by the Cal-IPC for their invasiveness. The Cal-IPC has evaluated silver wattle as “moderate” and blackwood acacia as “limited” in their respective abilities to invade wildlands. No rarity ranking exists for this community and it would not be considered sensitive under the CEQA.

Shrub-Dominated Communities

Coyote Brush Scrub (*Baccharis pilularis* Shrubland Alliance). The Study Area contains 5.01 acres of coyote brush scrub, all of which occur in the Subject Parcel (Photograph D.15, Appendix D). Holland (1986) recognizes this alliance as northern coyote brush scrub. Coyote brush scrub can grow up to approximately 10 feet tall, with a variable canopy and herbaceous layer and occurs throughout California (Sawyer 2009). This alliance was observed centrally within the Study Area, in upland areas. A range of non-native annual grassland species were observed intermixed within coyote brush scrub and co-dominant shrub and tree species included toyon (*Heteromeles arbutifolia*) and Callery pear (*Pyrus calleryana*). This alliance has a rarity ranking of G5 S5, indicating that this alliance is globally secure and secure in California; therefore, this community would not be considered sensitive under the CEQA.

French Broom Patches (*Genista monspessulana* Semi-Natural Shrubland Stands). The Study Area contains 0.41 acre of French broom patches located in disturbed, upland areas, of which 0.31 acre occur in the Subject Parcel (Photograph D.16, Appendix D). Sawyer et al.

(2009) describes broom patches (Broom [*Cytisus scoparius* and Others] Semi-Natural Shrubland Stands) as a shrub community reaching up to 16 feet in height, with an open to continuous canopy and intermittent herbaceous layer. Broom patches typically occur in disturbed places, including disturbed grasslands, and French broom notably has a Cal-IPC rating of “high”. Holland (1986) does not describe a respective community. No rarity ranking exists for this community and it would not be considered sensitive under the CEQA.

Herbaceous Communities

Non-Native Grassland (Multiple Alliances). Non-native annual grassland comprises 20.8 acres of the Study Area, of which 19.37 acres occur in the Subject Parcel (Photographs D.3-12, Appendix D). This community is classified by Holland as non-native grassland (1986). Non-native annual grassland is highly variable throughout the Study Area and throughout California in general. Non-native annual grassland typically occurs in open areas of valleys and foothills throughout California, usually on fine-textured clay or loam soils that are somewhat poorly drained (Holland 1986). Non-native grassland is usually dominated by non-native annual grasses and forbs, along with scattered native and non-native wildflowers. Sawyer et al. (2009) describe a variety of non-native grassland alliances which were observed on the Study Area including annual brome grasslands (*Bromus diandrus*, *B. hordeaceus* Semi-Natural Herbaceous Stands), Harding grass swards (*Phalaris aquatica* Semi-Natural Herbaceous Stands), and perennial rye grass fields (*Lolium perenne* Semi-Natural Herbaceous Stands). The annual brome grasslands on the Study Area contained both riggut brome (*Bromus diandrus*) and soft chess (*Bromus hordeaceus*), which are rated by the Cal-IPC as having “moderate” and “limited” invasive potential (2006). Harding grass and perennial rye grass are both rated by the Cal-IPC as having “moderate” potential for invasiveness. The non-native annual grassland observed within the Study Area included patches of upland mustards (e.g., *Brassica nigra*) and Pacific bentgrass (*Agrostis avenacea*). Black mustard (*Brassica nigra*) is rated by the Cal-IPC as having “moderate” potential for invasiveness and Pacific bentgrass is rated as having “limited” potential for invasiveness (2006). Non-native grassland alliances created a complex mosaic within the Study Area, and as such, all stands were mapped as a single non-native annual grassland community. No rarity ranking exists for non-native annual grasslands and they are not considered sensitive under the CEQA.

Pampas Grass Patches (*Cortaderia jubata* Semi-Natural Herbaceous Stands). The Study Area contains approximately 12.02 acres of pampas grass patches located in the central and northern portions of the site, of which 11.90 acres occur in the Subject Parcel (Photograph D.5, Appendix D). These large tussock grasses can grow up to 13 feet in stature, with generally open to continuous cover, and may contain emergent shrubs and trees. Pampas grass patches flourish in foggy coastal habitats that generally lack freezing temperatures. The species has very broad habitat requirements, and can tolerate drought conditions once established (Sawyer 2009). Holland (1986) does not describe a respective community. This herbaceous stand occurs in coastal land, disturbed areas, estuaries, grasslands, urban areas, and wetlands (Sawyer 2009). Because this species produces abundant small seeds (through both sexual and asexual means) that are readily dispersed, pampas grass is rated by the Cal-IPC as having “high” for its ability to invade wildlands (Cal-IPC 2014). No rarity ranking exists for this community and it would not be considered sensitive under the CEQA.

Fennel patches (*Foeniculum vulgare* Semi-Natural Herbaceous Stands). Fennel patches cover approximately 5.89 acres within the Study Area, of which 4.40 acres occur within the Subject Parcel (Photograph D.13, Appendix D). This community is described by Sawyer et al. (2009) describe this community as poison hemlock or fennel patches (*Conium maculatum*—

Foeniculum vulgare Semi-Natural Herbaceous Stands). Holland (1986) does not describe a respective community. Fennel is an invasive species with a Cal-IPC rating of “high”. Fennel patches occurred in upland habitat throughout the Study Area. No rarity ranking exists for this community and it would not be considered sensitive under the CEQA.

Developed/Disturbed Areas

Developed/disturbed areas within the Study Area consisted of non-vegetated areas that exhibit signs of regular human use. The Study Area contained 1.91 acres of developed or disturbed land composed of the formal and informal portions of the dirt and gravel pedestrian trails, of which 1.71 acres occurred in the Subject Parcel (Photographs D.13, D.17, D.18, Appendix D). Developed/disturbed areas are not considered sensitive under the CEQA.

3.3 Species Diversity and Special-Status Species

3.3.1 Plant Species

Overall Biodiversity

The Study Area contains a predominance of non-native plant species, consistent with the history of disturbance at the site. A total of 58 taxa were identified within the Study Area (Appendix A). The two most diverse families included the Poaceae (14 species) and Asteraceae (12 species). Of the 58 plant species, 20 were native species including 14 herbs (vines, ferns, forbs, and graminoids), three shrubs, and three trees. Of the remaining 38 non-native species, 12 were evaluated with “moderate” invasive potential and six were evaluated with “high” invasive potential by the Cal-IPC (2014). Additionally, 11 were considered to have only a “limited” invasive potential by the Cal-IPC. Two plant species were “assessed” by the Cal-IPC, but found to have no invasive potential.

Special-Status Plant Species

The CEQA requires an assessment of the potential for special-status plant species to occur within a project site. Special-status plants are those species that are designated as Endangered, Threatened, or Rare under the Federal Endangered Species Act or California Endangered Species Act, as well as species included by the CNPS on their Inventory of Rare and Endangered Plants (CNPS 2014). Vascular plants listed by the CNPS on this Inventory, but which have no designated status under state endangered species legislation, are defined as follows:

- | | |
|---------|--|
| Rank 1A | Presumed extirpated in California and either rare or extinct elsewhere |
| Rank 1B | Rare, threatened, or endangered in California and elsewhere |
| Rank 2A | Presumed extirpated in California, but more common elsewhere |
| Rank 2B | Rare, threatened, or endangered in California, but more common elsewhere |
| Rank 3 | Plants about which more information is needed - A review list |

Rank 4 Plants of limited distribution - A watch list

WRA performed a habitat assessment intended to determine the types of habitats present, their condition, and their potential for supporting rare plants. If a rare species was observed during the habitat assessment, its observation would be noted; however, the habitat assessment does not replace a rare plant survey, which is aimed at determining whether rare plants are present or absent.

Figure 5 shows the general locations of special-status plant species documented from within the referenced quadrangles. No special-status plant species were observed in the Study Area during the site visits conducted for this assessment, and based on conditions observed at the site, it was determined that the Study Area does not contain suitable habitat for the majority of the 89 special-status plant species documented from the vicinity (Appendix B). These species are generally associated with less disturbed habitats and habitats which are not present on the Study Area such as coniferous or broadleaf forest, coastal dune, bluff scrub, scrub, vernal pool, or chaparral communities. Some of the special-status plant species documented from the vicinity of the Study Area occur in valley or foothill grassland and cismontane woodland habitat. Although the Study Area contains marginal grassland and woodland habitats, both are comprised primarily of invasive plant species that have densely colonized the habitat, limiting the potential for these special-status plant species to become established in these areas. Additionally, these habitats are highly degraded in nature and are located in portions of the Study Area that have been historically disturbed through the reconfiguration of the entire area in the 1960s or 1970s, the recent history of fire within the site and subsequent fire management efforts, and the persistent recreational use of the site by the public. Consequently, special-status species that typically habituate in valley and foothill grassland and cismontane woodland were determined to have low potential to occur on the Study Area.

Some special-status plant species were also determined to have low potential to occur within the Study Area due to the lack of current observations within the vicinity of the Study Area. For example, saline clover (*Trifolium hydrophilum*, CNPS Rank 1B.2) is a rare species that typically occurs in mesic and alkali marshes and swamps; however, its only observation within the greater vicinity of the Study Area was from 1900 and occurred over 7 miles east of the Study Area. Due to the lack of contemporary observations, the large distance between the Study Area, and the last documented occurrence, as well as the weedy, disturbed nature of the Study Area, it was determined that this species has low potential to occur on the Study Area.

Special-status plant species that were identified with a moderate to high potential to occur within the Study Area are discussed below. A discussion of species determined to have no to low potential to occur on the Study Area is provided in Appendix B.

Point Reyes Bird's-Beak (*Chloropyron maritimum* ssp. *palustre*), CNPS Rank 1B.2. High Potential. Point Reyes bird's-beak is an annual herb in the figwort family (Scrophulariaceae) that blooms from June to October. It typically occurs in coastal salt marsh habitat at elevations ranging 0 to 33 feet (CDFW 2014, CNPS 2014). Observed associated species include saltgrass, pickleweed, cord grass (*Spartina* spp.), fleshy jaumea (*Jaumea carnosa*), bulrushes (*Bolboschoenus* spp., *Schoenoplectus* spp., *Scirpus* spp.), and Baltic rush (*Juncus balticus*) (CDFW 2014).

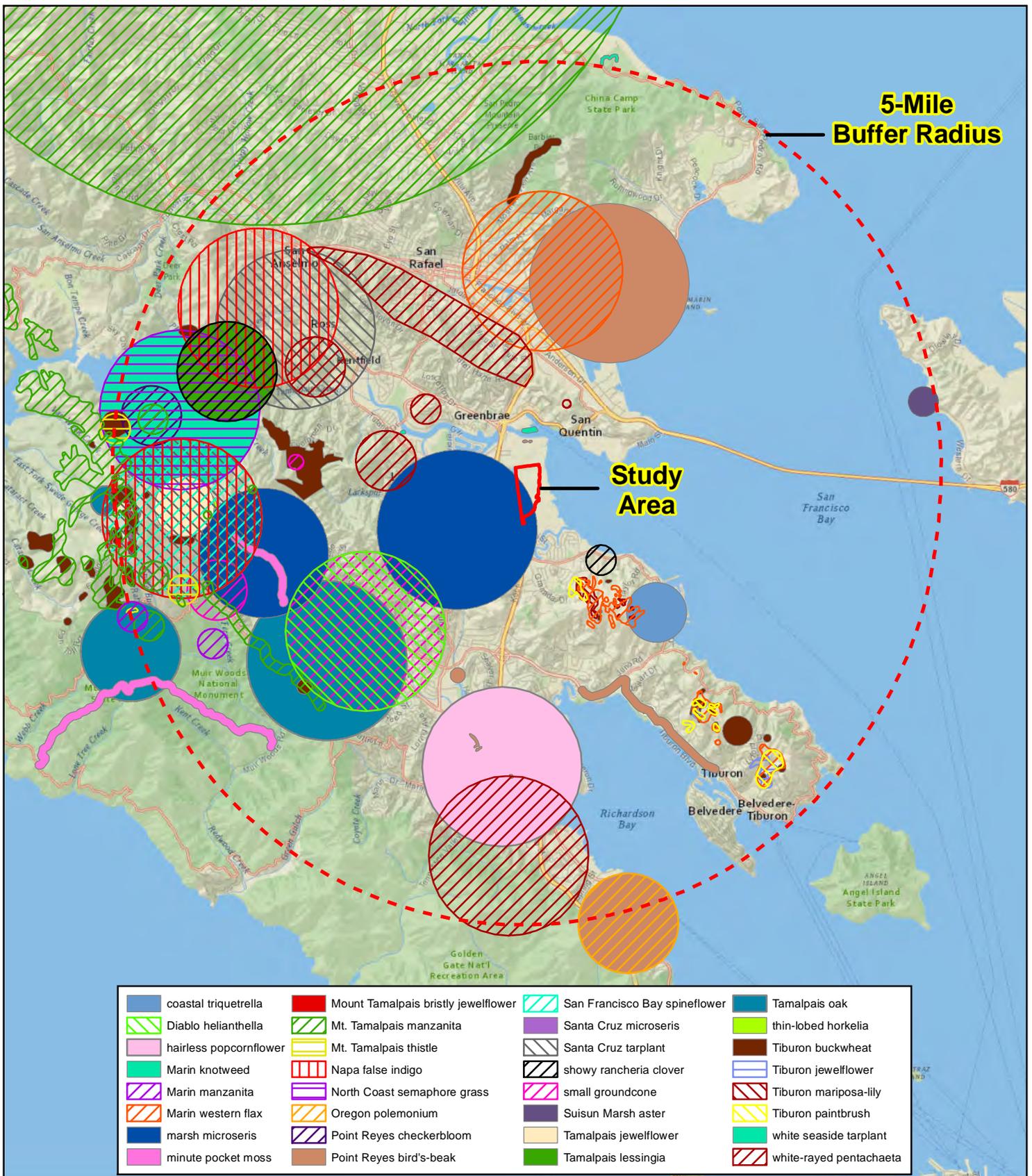


Figure 5. Special-Status Plant Species Historically Documented within a 5-Mile Radius of the Study Area

Wetland Restoration Design and Permitting Support Services at Corte Madera Ecological Reserve
Town of Corte Madera, Marin County, California



Map Prepared Date: 1/7/2015
Map Prepared By: pkobylarz
Base Source: Esri, National Geographic
Data Source(s): WRA, CNDDB

There are nine CNDDDB (CDFW 2014) records from the referenced quadrangles. The nearest known occurrence is from August 1987, less than half a mile north of the Study Area in the CMMER, where 100 to 200 plants were reportedly present along the south bank of Corte Madera Creek in a dense stand of pickleweed with sparse stands of California sea lavender (*Limonium californicum*) (CDFW 2014). Point Reyes bird's-beak was determined to have high potential to occur outboard of the levee perimeter in the Study Area due to the presence of coastal salt marsh habitat, the close proximity of the nearest occurrences, and the presence of associated species within the Study Area. However, this species was determined to have low potential to occur inboard of the perimeter levee due to the lack of tidal influence and the disturbed nature of the seasonal wetlands in this part of the Study Area.

Marin Knotweed (*Polygonum marinense*), CNPS Rank 3.1. High Potential. Marin knotweed is an annual forb in the buckwheat family (Polygonaceae) that blooms from as early as April to as late as October. It usually habituates in salt and brackish coastal marshes at elevations ranging up to 35 feet above sea level (CDFW 2014, CNPS 2014a). Observed associated species include pickleweed, saltgrass, Oregon gumweed, alkali seaheath, sedges (*Carex* spp.), salt marsh bulrush, and fathen (CDFW 2014).

Three documented occurrences of Marin knotweed have been reported within the greater vicinity of the Study Area (CDFW 2014). The nearest occurrence was documented in 1989, less than half a mile north of the Study Area, where approximately 20 plants were observed in high marsh habitat between the Larkspur ferry parking lot and the mouth of Corte Madera Creek. All documented occurrences describe habitat consisting of tidal salt marsh with pickleweed and saltgrass. Marin knotweed was determined to have high potential to occur outboard of the perimeter levee in the Study Area due to the presence of suitable tidal salt marsh habitat and the proximity of documented occurrences for this species. This species was determined to have low potential to occur inboard of the perimeter levee where a lack of tidal activity and the disturbed nature of seasonal wetlands limits the potential for this species to occur.

3.3.2 Wildlife Species

Overall Biodiversity

The Study Area has been modified from the tidal salt marsh habitat that historically occurred there. The site is dominated by non-native and invasive species and has a high level of disturbance from human activity and off-leash dogs. Accordingly, the site assessment detected a lower-than-expected level of wildlife diversity for the area. In particular, bird diversity was substantially lower than expected given the high diversity of bird species observed in the adjacent Shorebird Marsh. The variety of grassland communities at the site combined with trees, shrubs, and adjacent tidal marsh would have been expected to host a larger number and diversity of bird species than was observed during the site visits. No raptor species, other than turkey vultures (*Cathartes aura*), and only 12 passerine bird species were observed on or flying over the Study Area. The disturbance caused by presence of homeless encampments and regular access by joggers and dog walkers, including the presence of off-leash dogs, is likely a cause for the lower diversity of bird species observed on the site. This level of disturbance likely reduces the quality of the seasonal wetland and grassland habitats inboard of the perimeter levee for use by shorebirds as a refuge during high tides. The low diversity of shorebirds observed inboard of the perimeter levee may also be a result of the presence of relatively higher

quality habitat at the adjacent Shorebird Marsh which contains sandbars and islands that can be used by shorebirds during high tide. These islands provide ideal refugia for shorebirds as they are isolated from potential disturbance caused by humans, off-leash dogs, or feral house cats (*Felis catus*), all of which were observed within the upland and seasonal wetland habitats inboard of the perimeter levee within Study Area.

Although, the Study Area inboard of the perimeter levee is highly disturbed, the tidal salt marsh habitat in the adjacent CMMER provides suitable habitat for many bird species commonly associated with tidal salt marsh. An individual California clapper rail (*Rallus longirostris obsoletus*; Federal Endangered) was observed in tidal salt marsh habitat outboard of the perimeter levee at the northern edge of the Study Area. Given the lack of direct tidal connection in the seasonal wetland habitat inboard of the perimeter levee, it is unlikely that any clapper rail would use this habitat. It is likely that the seasonal wetlands inboard of the perimeter levee provide foraging habitat for some shorebirds and wading birds, both resident and migratory, when inundated during the winter and spring months, but provide little value during the majority of the year when they are dry. Single individuals of snowy egret (*Egretta thula*) and great egret (*Ardea alba*) were the only shorebirds observed inboard of the perimeter levee during the site visits conducted for this assessment.

Mammals typical of disturbed areas were observed on the Study Area during the site visits, including black-tailed jackrabbit (*Lepus californicus*), feral house cats, and raccoon (*Procyon lotor*). In addition, evidence of small burrowing mammals such as vole (*Microtus* spp.) were noted. No gopher or ground squirrels or their associated burrows were observed, but nests of tree squirrel species (*Sciurus* spp.) were noted in several trees. The Study Area is surrounded by urban development, tidal salt marsh, and the San Francisco Bay; therefore, large mammals and higher mammal diversity is not anticipated because of the lack of connectivity with occupied habitat and lack of space to support medium to large mammals. No reptile or amphibian species were observed in the Study Area, and the brackish nature of the seasonal wetland habitat inboard of the perimeter levee, as well as the development to the west of the site, make it unlikely that amphibians are present within the Study Area. Invertebrate diversity is more challenging to measure; only one swallowtail butterfly species (*Papilio* spp.) was observed during the site visits.

Special-Status Wildlife Species

The CEQA requires an assessment of the potential for special-status wildlife species to occur within a project site. Special-status wildlife species include species that have been formally listed, are proposed as endangered or threatened, or are candidates for either listing under the federal and/or California Endangered Species Acts. Additionally, CDFW Species of Special Concern, and USFWS Birds of Conservation Concern are also considered special-status species. Although these latter two categories generally have no special legal status, they are given special consideration under the CEQA. Finally, wildlife species considered sensitive by the County of Marin are also treated as special-status within this document.

Based on the database searches conducted for this assessment, it was determined that 39 special-status species of wildlife have been recorded from the referenced quadrangles. Fourteen of these species have been documented within 5 miles of the Study Area (Figure 6; CDFW 2014), and an additional two species are known to occur in the vicinity based on WRA's knowledge of the area. Appendix B summarizes the potential for each of these species to occur on the Study Area. Two special-status wildlife species were observed on the Study Area during the site visits conducted for this assessment: California clapper rail and San Pablo song

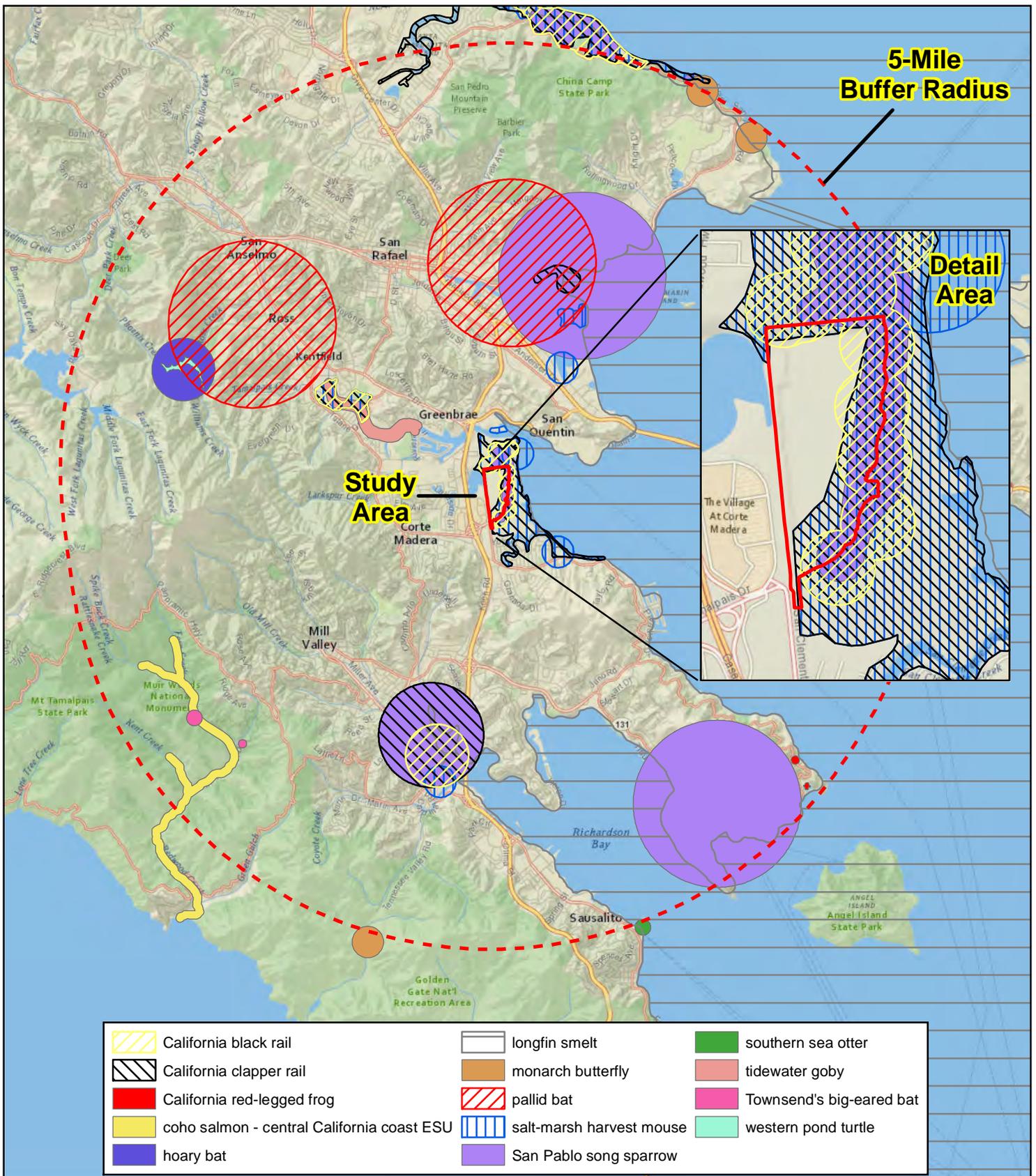


Figure 6. Special-Status Wildlife Species Historically Documented within a 5-Mile Radius of the Study Area

Wetland Restoration Design and Permitting Support Services at Cortes Madera Ecological Reserve
Town of Cortes Madera, Marin County, California



Map Prepared Date: 1/7/2015
Map Prepared By: pkobylarz
Base Source: Esri, National Geographic
Data Source(s): WRA, CNDDB

sparrow (*Melospiza melodia samuelis*). An additional five special-status wildlife species were determined to have a moderate or high potential to occur on the Study Area.

Special-status species observed or that were determined to have moderate to high potential to occur on the Study Area are discussed below.

Observed Species

California Clapper Rail (*Rallus longirostris obsoletus*), Federal Endangered, State Endangered, CDFW Fully Protected. California clapper rail nest predominantly in the low portions of coastal wetlands and tidal sloughs dominated by cordgrass (*Spartina* spp.), pickleweed (*Salicornia* spp.), and gumplant (*Grindelia cuneifolia*). Factors important for breeding are well-developed sloughs and secondary tidal channels; extensive (dense, tall, lush) cordgrass stands; dense salt marsh vegetation for cover, nest sites, and brooding areas; intertidal mudflats, gradually sloping banks of tidal channels, and cordgrass beds for foraging; abundant invertebrate food resources; and transitional vegetation at the upland edge of the salt marsh as a refuge during high tides (Harvey 1988). Nests are placed in locations that are not flooded by tides, yet that have dense enough cover to be hidden from predators and to support a relatively large nest.

This species was observed foraging on an exposed mudflat within the tidal channel outboard of the perimeter levee in the northwestern portion of the Study Area. In addition, the tidal marsh habitat surrounding the Study Area is surveyed each year for clapper rails by the Invasive *Spartina* Project and Point Blue Conservation Science, and both organizations have detected numerous clapper rails during breeding season surveys in the marshes to the north, east, and south of the Study Area (Olofson Environmental 2013, PBCS 2014). It is unlikely that clapper rails nest within the tidal pickleweed habitat outboard of the perimeter levee in the northwest portion of the Study Area due to human activity and the presence of off-leash dogs. It is also unlikely that clapper rails nest within the pickleweed habitat inboard of the perimeter levee due to the lack of tidal channels and tidal activity and due to the presence of off-leash dogs. However, it is extremely likely that clapper rails nest within approximately 650 feet of the Study Area in adjacent suitable tidal salt marsh habitat. Restoration of tidal salt marsh habitat within the portions of the Study Area inboard of the perimeter levee will increase the value of this habitat for California clapper rail.

San Pablo Song Sparrow (*Melospiza melodia samuelis*), CDFW Species of Special Concern, USFWS Bird of Conservation Concern. San Pablo song sparrow inhabits salt, fresh, and brackish marshes and the moist, brushy, weedy edges of these habitats in the San Pablo Bay. The song sparrow avoids areas where water is stagnant and/or tidal flow is obstructed (Shuford 1993). Song sparrows were observed along the tidal marsh portions of the Study Area, outboard of the perimeter levee. This species likely breeds along the outboard areas of the Study Area, near the levees where suitable pickleweed and upper tidal marsh plants occur (e.g., Oregon gumweed, *Grindelia stricta* var. *platyphylla*). Restoration of tidal salt marsh habitat within the portions of the Study Area inboard of the perimeter levee will increase the value of this habitat for San Pablo song sparrow, particularly if restoration efforts include the development of native shrubby vegetation within the tidal marsh-upland transition zone.

Species with Moderate to High Potential to Occur

Salt-Marsh Harvest Mouse (*Reithrodontomys raviventris*), Federal Endangered, State Endangered, CDFW Fully Protected. High Potential. Salt-marsh harvest mouse (SMHM) is

found only in saline emergent wetlands of San Francisco Bay where suitable dense vegetative cover is present for escape during high tides. The primary food source for SMHM includes seeds and pickleweed. The basic habitat associated with SMHM has been described as pickleweed-dominated vegetation (Fisler 1965), although more recent studies have shown that SMHM is supported equally in pickleweed-dominated and mixed-vegetation, including native and non-native salt- and brackish-marsh vegetation (Sustaita et al. 2005, Sustaita et al. 2011). Known SMHM habitat in the Suisun Bay is often composed of mixed salt- and brackish-marsh species such as rushes (*Juncus* spp.), alkali sea heath, fathen, and saltgrass, with pickleweed as a relatively minor component. Diked marshes where adjacent upland cover has been eliminated are generally not favored; however, SMHM appear to have adapted to these areas where suitable salt- and brackish-marsh vegetation is present (Shellhammer et al. 1982, Geissel 1988, Sustaita et al. 2011).

The tidal pickleweed habitat outboard of the perimeter levee and the non-tidal pickleweed habitat found within seasonal wetlands inboard of the perimeter levee in the southern and eastern portions of the Study Area provide potentially suitable habitat for SMHM. Trapping performed in 1990 confirmed the species was present in the tidal marsh habitat directly east of the Study Area. No substantial changes in habitat have occurred since that time, and therefore, SMHM is presumed to be extant in the tidal marshes surrounding the Study Area. The presence of this species in the marshes adjacent to the Study Area increases likelihood that SMHM may be found in the non-tidal pickleweed habitat located inboard of the perimeter levee within the Study Area, particularly in the densest pickleweed habitat located at the southern end of the Study Area. The seasonal wetland habitat (when not inundated) and upland habitats within the Study Area may provide upland refuge habitat for SMHM during high tides. Restoration of tidal salt marsh habitat within the Study Area will increase value of this habitat for SMHM; however, any restoration efforts should incorporate areas of seasonal wetland and upland habitat for use as refugia for SMHM during high tides.

Northern Harrier (*Circus cyaneus*), CDFW Species of Special Concern. Moderate Potential. Harriers are residents of open wetlands, including wet meadows; old fields; and freshwater and brackish marshes. They also frequent drier habitats, including upland prairies, mesic grasslands, drained marshlands, croplands, cold desert shrub-steppe, and riparian woodland throughout California (MacWhirter and Bildstein 1996). Harriers typically nest on ground in open (i.e., treeless) habitats in dense, often tall, vegetation, but exhibit extremely varied choice of vegetative cover, even within a single area. The species occurs on a range of soil types, including drained and non-drained wetland soils as well as upland soils. The Study Area contains suitable nesting and foraging habitat for this species; however, the Study Area receives high disturbance from humans and off-leash dogs which may preclude nesting on the Study Area. No northern harriers were observed during the site assessments conducted for this report.

White-Tailed Kite (*Elanus leucurus*), CDFW Fully Protected. Moderate Potential. White-tailed kite is a resident in a variety of open habitats including agricultural areas, grasslands, scrub, wet meadows, and emergent wetlands throughout the lower elevations of California. Nests are constructed mostly of twigs and placed in small to large trees, often at habitat edges or in isolated groves (Dunk 1995). This species preys upon a variety of small mammals and other vertebrates. The Study Area provides open grassland habitat for foraging and suitable trees for nesting; however, high levels of disturbance from human and off-leash dog activity on the Study Area may preclude nesting by this species.

California Black Rail (*Laterallus jamaicensis coturniculus*), State Threatened, CDFW Fully Protected, USFWS Bird of Conservation Concern. Moderate Potential. This species occurs most commonly in the upper tidal zone of emergent wetlands or brackish marshes dominated by bulrush (*Bolboschoenus* spp., *Schoenoplectus* spp., *Scirpus* spp.), cordgrass (*Spartina* spp.), or pickleweed (*Salicornia* spp.). The species most commonly nests in dense cover such as that of pickleweed (Eddelman et al. 1994). California black rail has been documented in the adjacent marsh of the CMMER. Suitable habitat for California black rail is limited to the tidal salt marsh habitat outboard of the perimeter levee within the Study Area; however, this species may nest in suitable tidal marsh habitat within approximately 650 feet of the Study Area.

San Francisco (Salt Marsh) Common Yellowthroat (*Geothlypis trichas sinuosa*), USFWS Bird of Conservation Concern, CDFW Species of Special Concern. Moderate Potential. This subspecies of the common yellowthroat is found in freshwater marshes, coastal swales, riparian thickets, brackish marshes, and saltwater marshes. Their breeding range extends from Tomales Bay in the north, Carquinez Strait to the east, and Santa Cruz County to the south. This species requires thick, continuous cover such as that of tall grasses, tule patches, or riparian vegetation that reaches down to the water surface for foraging. The species prefers willows for nesting. Vegetation along the levees and areas of dense vegetation in the northeast and extreme south of the Study Area may provide suitable nesting habitat; however, high disturbance from humans and off-leash dogs in this area lowers the potential for nesting on the Study Area.

Wildlife Dispersal Corridors

Wildlife movement between suitable habitat areas can occur via landscape linkages and wildlife movement corridors. The primary function of both wildlife corridors and landscape linkages is to connect two larger habitat blocks, also referred to as core habitat areas (Beier 1992, Soulé and Terborgh 1999). For the purpose of this analysis, the term “landscape linkage” is used in a regional planning context, as a broad-scale mapping of natural habitat that functions to join two larger habitat blocks. The term “wildlife corridor” is used here in the context of smaller scale, local area planning, where wildlife movement may be facilitated by specific local biological habitats or passages and/or may be restricted by barriers to movement. Corridors and linkages vary by species due to their unique habitat requirements, life histories, size, tolerance of disturbance, and movement patterns. Some species, particularly flying species, can use “stepping stone” dispersal habitats, or closely spaced pockets of habitat that can be used during dispersal between larger core habitat areas (Forman 1995). Because the ideal corridors can vary by species, wildlife movement is typically analyzed based on suitability for several focal species. Above all, wildlife corridors must link two areas of core habitat and should not direct wildlife to developed areas or areas that are otherwise void of core habitat (Hilty et al. 2006).

At the landscape linkage scale, the Study Area is located in the north-central San Francisco Bay Estuary (Estuary). The Study Area occurs along the northwest shore of the San Francisco Bay near the entrance to San Pablo Bay, approximately 4.5 miles to the northeast. The Estuary occurs along the Pacific flyway migration route, and shallows and wetlands provide resting and feeding areas for migrating waterfowl and wading birds. The Study Area is assumed to provide resting and foraging habitat for waterfowl and wading birds when the seasonal wetlands inboard of the perimeter levee are inundated; however, it likely provides little value to these species during the portion of the year when the wetlands are dry. At the landscape scale, the tidal salt marsh surrounding the Study Area provides one of the largest contiguous blocks of this habitat type within the northern portion of the Estuary, with the closest comparable blocks of tidal salt

marsh habitat occurring to the southwest near the town of Almonte in Richardson Bay and to the northeast at Gallinas Creek in San Pablo Bay. Restoration of tidal saltmarsh habitat in the inboard portion of the Study Area would substantially increase the regional availability of this habitat; increasing the regional importance of this marsh as a “stepping stone” linkage for wildlife species associated with tidal salt marsh, including listed species such as California clapper rail.

The Estuary provides habitat for many species of fish which require a range of environments, such as open water and sloughs, to support different life stages. In addition, the Estuary is a migration route for anadromous fish species such as salmonids which migrate from the Pacific Ocean through the Estuary to rivers and streams upstream of the San Francisco Bay. These fish species use near-shore habitats, sloughs, and channels during migration and juvenile rearing; however, the Study Area, with the exception of the tidal channel at the north, does not currently provide refuge or habitat for fish species. In addition, the Study Area is isolated from adjacent tidal marsh habitat along San Francisco Bay. It is encompassed by development and the San Francisco Bay; there is no connectivity for most non-avian terrestrial species within the Study Area, except those capable of inhabiting disturbed and developed areas such as raccoons or feral house cats. Given the surrounding development and tidal salt marsh, it is unlikely that restoration of upland habitats within the Study Area will improve local connectivity for non-avian terrestrial species.

At a local-scale, the Study Area is encompassed by the marshes of the CMMER. These marshes support lower to mid-tidal marsh species including listed species such as California clapper rail, California black rail, and SMHM. The adjacent Corte Madera Shorebird Marsh provides habitat for shorebirds and waterfowl, both resident and migratory, such as American white pelican (*Pelecanus erythrorhynchos*), American avocet (*Recurvirostris americana*), and black-bellied plover (*Pluvialis squatarola*). Although all portions of these marshes are connected, the diked portions of the Study Area reduce the connectivity between the tidal salt marsh habitat to the north and south, particularly for non-avian species such as the SMHM and for avian species that rely heavily on tidal sloughs for movement, such as clapper rails. Restoration of tidal salt marsh habitat inboard of the perimeter levee would provide a substantial increase in the local availability of tidal salt marsh habitat and would increase connectivity for listed and other tidal marsh wildlife species such as clapper rails and SMHM. At the local-scale, the seasonal wetland (when dry) and upland habitats within the inboard portions of the Study Area may provide suitable upland refugia for SMHM during high tides. However, a large portion of the seasonal wetland habitat within the Study Area contains relatively sparse cover (e.g., the fathen and brass button fields shown on Figure 4), reducing its quality for SMHM. The presence of off-leash dogs and feral house cats also reduces the quality of this habitat for SMHM. Recreation of upper marsh and transition zones, which are generally poorly developed in tidal marsh wetlands in the region, would improve the quality of habitat for SMHM, as well as for shorebirds.

3.4 Other Management Concerns

3.4.1 Non-Native, Invasive Plant Species

Thirty-two plant species considered invasive by Cal-IPC (2014) were observed on the Study Area (Tables 3, 4, Appendix A). Figure 4 shows the distribution of the primary invasive species found on the Study Area. Invasive plant species of the highest concern for specific management goals and the conservation of biological resources on the Study Area are discussed below and summarized in Table 4. The assessment for each species is based on existing distribution within the Study Area as well as the likelihood of expansion within the Study Area based on available habitat. Other factors including threats to wildlife and native vegetation were considered in this assessment. Invasive plant species with the greatest threat to wildlife and native vegetation tend to be species with long-lived seed banks and/or that are stand-forming in areas where shading, forage, or toxic substances can limit the distribution of native species. Based on the criteria described above, WRA evaluated the invasive plant species observed on the Study Area and identified 19 species which are of most concern. These species are listed in Table 4 and are discussed below.

Trees or Shrubs

Silver Wattle (*Acacia dealbata*), Cal-IPC Moderate. Silver wattle is a tree or shrub that was introduced from southeastern Australia and has naturalized in the wild. The species is typically found in disturbed sites and along roadsides in the Western North Coast Ranges, in the San Francisco Bay region, and in the South Coast Ranges. This species has been rated by the Cal-IPC as “moderate” (Cal-IPC 2014). This species reproduces by seed, with long-lived seeds being dispersed by human activities or water (DiTomaso 2007). Silver wattle is best managed through manual removal of seedlings before roots are well established.

French Broom (*Genista monspessulana*), Cal-IPC High. French broom occurs as a shrub reaching up to 10 feet in height. The species was historically introduced from the Mediterranean as a landscape ornamental and used to prevent soil erosion in the 1900s (DiTomaso 2007). French broom easily forms dense stands that displace native vegetation and wildlife and diminish the use of rangeland. The flowers and seeds of French broom can be toxic to humans and livestock when ingested, though toxicity problems are uncommon (DiTomaso 2007). This species has been rated by the Cal-IPC as “high” (Cal-IPC 2014). Established populations of French broom are difficult to eliminate due to their persistent, large seed bank. Manual removal prior to fruit production via annual monitoring of the species along with minimized soil disturbance can help in preventing new infestations. Confining goat grazing to areas of infestations has proven effective as well as cutting shrubs to ground level at the end of the dry season to reduce the root crown. Also, planting native shrubs and trees in areas around broom stands can eventually minimize infestations by shading out the species.

Lollypop tree (*Myoporum laetum*), Cal-IPC Moderate. Lollypop tree is an escaped cultivar evergreen shrub or small tree that is native to New Zealand, and is distributed throughout the San Francisco Bay region, within the southern North Coast, Central, and South Coasts of California (DiTomaso 2007). Lollypop tree typically occurs in disturbed coastal habitats, woodland riparian areas, and on moist soils near urban areas. Once established, it can tolerate alkalinity and considerable drought, although it grows best on moist soils. It reproduces by seed, which can be dispersed great distances by water, soil movement, human activities, and animals. Trees and shrubs of this species will typically grow new shoots if cut, and therefore management requires cutting the plants to ground level and immediately treating the remaining

stump with a systemic herbicide. Additionally, annual manual removal of seedlings will prevent the return of the species.

Table 3. Summary of life forms and Cal-IPC rating for invasive plant species observed on the Study Area.

Rank/Life Form	Assessed	Limited	Moderate	High	Total
Trees	--	3	1	--	4
Shrubs	--	1	1	2	4
Forbs	2	4	4	2	12
Graminoids	--	3	7	2	12
Total	2	11	13	6	32

Table 4. Invasive plant species determined to have the greatest threat to native wildlife and vegetation within the Study Area.

Species	Common Name	Cal-IPC Rating
<i>Acacia dealbata</i>	Silver wattle	Moderate
<i>Avena barbata</i>	Slender oat	Moderate
<i>Avena fatua</i>	Wild oat	Moderate
<i>Brassica nigra</i>	Black mustard	Moderate
<i>Bromus diandrus</i>	Ripgut brome	Moderate
<i>Bromus hordeaceus</i>	Soft chess	Limited
<i>Cirsium vulgare</i>	Bull thistle	Moderate
<i>Cortaderia jubata</i>	Pampas grass	High
<i>Cotula coronopifolia</i>	Common brassbuttons	Limited
<i>Festuca perennis</i>	Italian ryegrass	Moderate
<i>Foeniculum vulgare</i>	Fennel	High
<i>Genista monspessulana</i>	French broom	High
<i>Holcus lanatus</i>	Common velvet grass	Moderate
<i>Hordeum marinum ssp. gussoneanum</i>	Mediterranean barley	Moderate
<i>Hypochaeris radicata</i>	Hairy catsear	Moderate
<i>Lepidium latifolium</i>	Perennial pepperweed	High
<i>Lythrum hyssopifolia</i>	Hyssop loosestrife	Moderate
<i>Myoporum laetum</i>	Lollypop tree	Moderate
<i>Phalaris aquatica</i>	Harding grass	Moderate
<i>Rubus armeniacus</i>	Himalayan blackberry	High

Himalayan Blackberry (*Rubus armeniacus*), Cal-IPC High. Himalayan blackberry is a vigorous cultivar introduced from Eurasia. Himalayan blackberry typically occurs in disturbed, moist sites and tolerates periodic flooding (DiTomaso 2007). Fruits of this plant are an important food source for wildlife species, particularly birds. Himalayan blackberry reproduces via seeds, root sprouts, and stem tip rooting, and is dispersed great distances by animals, including birds. This species has been rated by the Cal-IPC as “high” (Cal-IPC 2014). Small populations of blackberry may be controlled by manual removal, although removing only aboveground portions stimulates root sprouting. Repeated cutting may exhaust root stores; however, the most effective management strategy is the use of systemic herbicides in the summer to early fall (DiTomaso 2007).

Herbs

Black Mustard (*Brassica nigra*), Cal-IPC Moderate. Black mustard is an annual herb native to Europe. The species occurs throughout California at elevations up to approximately 4,900 feet along roadsides, fields, and disturbed sites and prefers coastal areas that have a mild winter climate. This species has been rated by the Cal-IPC as “moderate” for its invasive ability (Cal-IPC 2014). It can grow up to approximately 6.5 feet tall, typically forming dense stands, which outcompete native vegetation and has allelopathic properties that further hinder native plant growth. Black mustard reproduces by seed and mustards develop a deep, persistent seed bank with a survival period for deeply buried seeds of over 50 years. The most effective management for this species includes depleting the seed bank through yearly manual removal of plants prior to seed maturity (DiTomaso 2007).

Bull Thistle (*Cirsium vulgare*), Cal-IPC Moderate. Bull thistle is an erect perennial herb in the sunflower family (Asteraceae), native to Eurasia. The species is common throughout temperate and Mediterranean climate regions of the world. It grows in agronomic and vegetable crop fields, along stream banks, in moist depressions, and gardens, and while this species tolerates a variety of soil conditions, it prefers moist soils. As true with most thistles, bull thistle reproduces by seed and can tolerate low moisture conditions for germination as compared to other thistles. This species has been rated by the Cal-IPC as “moderate” for its invasive ability (Cal-IPC 2014). Heavy grazing and disturbances to bull thistle that create bareground facilitate seeding establishment and survival. The most effective management practices for this species have proven to be repeated mowing, hand-pulling, and proper disposal methods prior to plant flowering (DiTomaso 2007).

Common Brassbuttons (*Cotula coronopifolia*), Cal-IPC Limited. Common brassbuttons is an immersed to terrestrial perennial herb in the sunflower family (Asteraceae), that grows up to 1.5 feet tall and is native to South Africa. Common brassbuttons commonly habituates in freshwater and salt marshes, wetlands, vernal pools, ditches, and seasonally wet places (DiTomaso 2007). This species does not tolerate significant frost and reproduces via seeds and vegetatively from stems at root nodes. Management for this species is challenging due to its widespread nature. This species has been rated by the Cal-IPC as “limited” (Cal-IPC 2014). Although it has low invasive potential, it is included here due to its widespread occurrence in seasonal wetlands on the Study Area.

Fennel (*Foeniculum vulgare*), Cal-IPC High. Fennel is a perennial herb in the carrot family (Apiaceae) that is native to southern Europe and occurs throughout central and southern California. It forms dense stands that are highly competitive with native vegetation in fields, grasslands, riparian areas, wetlands, in natural communities, with agronomic crops, along roadsides, and in disturbed sites. Fennel reproduces by seed and sometimes vegetatively from

root or crown fragments. This species is rated by the Cal-IPC as “high” for its invasive ability (Cal-IPC 2014). Management of this species through manual removal of individual plants, including roots, is an efficient control method on sites with minimal invasion; however, given the large stands of fennel within the Study Area, management through the removal of aboveground biomass during the fall followed by chemical treatment of new foliage for two years will be more efficient (DiTomaso 2007).

Hairy Catsear (*Hypochaeris radicata*), Cal-IPC Moderate. Hairy catsear is a perennial herb in the sunflower family (Asteraceae) that is native to Europe. It is found throughout California at elevations up to approximately 1,600 feet and thrives in overgrazed pastures and rangelands, but can be found in disturbed sites, fields, grassland, orchards, vineyards, landscaped areas, and gardens. Hairy catsear reproduces via seed, with wind dispersal, contact with animals, and human activities attributing to its distribution. It can also reproduce vegetatively by offsets from the crown, but root fragments do not regenerate once detached from the crown. This species can produce mature seeds only two months after seedling establishment. Hair catsear is rated by the Cal-IPC as “moderate” for its invasive ability (Cal-IPC 2014). Given that mowing, grazing, and burning have all proven to facilitate plant survival and germination, recommended management for this species includes covering undisturbed vegetation to discourage establishment and reproduction (DiTomaso 2007).

Perennial Pepperweed (*Lepidium latifolium*), Cal-IPC High. Perennial pepperweed is an erect perennial that was introduced from Eurasia in the mid-1930s. This species is widespread in California and can form dense colonies in moist or seasonally wet sites that displace native vegetation and wildlife. It has been documented to be toxic to horses in small amounts. Perennial pepperweed reproduces through seed and from root fragments and is difficult to control (DiTomaso 2007). Perennial pepperweed is rated by the Cal-IPC as “high” for its invasive ability (Cal-IPC 2014). Repeated manual plant removal prior to seed maturity in combination with herbicide application is the most effective control method for this species.

Hyssop Loosestrife (*Lythrum hyssopifolia*), Cal-IPC Moderate. Hyssop loosestrife is a prostrate to erect annual or perennial herb of the loosestrife family (Lythraceae) that is native to Europe. This species occurs throughout California and is a common minor weed of seasonal wetlands and agricultural fields for crops such as rice. It often grows on exposed mud and tolerates some salinity, although it is sensitive to heavy frost. Hyssop loosestrife reproduces primarily by seed, with an average of 3,200 seeds per plant; however, stem fragments may develop roots under favorable conditions (DiTomaso 2007). This species is rated by the Cal-IPC as “moderate” for its invasive ability (Cal-IPC 2006). Repeated manual plant removal prior to seed maturity in combination with herbicide application is the most effective control method for this species.

Grasses

Pampas Grass (*Cortaderia jubata*), Cal-IPC High. Pampas grass is a large, densely tufted perennial that is native to South America. Pampas grass is an escaped cultivar that occurs throughout California (especially in coastal areas) and was originally introduced for landscaping and for erosion control. It can grow up to approximately 13 feet tall and forms tussocks that can persist for up to 15 years. It is highly competitive with native vegetation and tolerates a variety of conditions and habitats. This species reproduces by seed with each seed-bearing plume producing up to 100,000 seeds that are dispersed by wind and human activities. This species is rated by the Cal-IPC as “high” for its invasive ability (Cal-IPC 2014). Recommended

management includes hand-pulling seedlings and manually chopping mature plants below the crown before seeds mature (DiTomaso 2007).

Italian Ryegrass (*Festuca perennis*), Cal-IPC Moderate. Italian ryegrass is a vigorous annual or biennial or sometimes short-lived perennial forb that is cultivated as a cover crop and was introduced as an early European agricultural cultivar (DiTomaso 2007). Italian ryegrass occurs throughout California and reproduces by seed with an abundant seed production that usually germinates in the fall, after the first significant rain event. This species tolerates trampling, mowing, and grazing, but will not persist on infertile soils or with competition with other grasses (DiTomaso 2007). Italian ryegrass has become a ubiquitous part of the California flora and is extremely difficult to control. Although it will not eliminate Italian ryegrass entirely from the Study Area, prescribed grazing in combination with restoration plantings may reduce the vegetative cover of Italian ryegrass. This species has been rated by the Cal-IPC as “moderate” (Cal-IPC 2014).

Common Velvetgrass (*Holcus lanatus*), Cal-IPC Moderate. Common velvetgrass is a tufted perennial forb in the grass family (Poaceae) native to Europe. The species occurs throughout California, establishing best in moist soils of roadbanks, cultivated fields, and meadows at elevations up to approximately 7,900 feet (Smith 2013). However, it exhibits a wide climactic tolerance and invades disturbed and undisturbed sites alike, through its prolific seed bank and rhizomatous reproduction (Cal-IPC 2014). Recommended management for this species includes manual removal, cultivation, intensive mowing or grazing, and elimination of irrigation; however, occasional mowing or low intensity grazing may actually enhance common velvetgrass establishment (DiTomaso 2007). This species has been rated by the Cal-IPC as “moderate” for its invasive ability (Cal-IPC 2014).

Harding Grass (*Phalaris aquatica*), Cal-IPC Moderate. Harding grass is a perennial forb that can grow up to approximately 5 feet tall. It was introduced from Mediterranean Europe to provide extra-seasonal forage on pastures and rangeland; however, it has escaped cultivation in riparian areas and moist places throughout California. Harding grass occurs in riparian areas, along ditch banks, and in fields, and can tolerate both frost and drought (DiTomaso 2007). This species reproduces by seeds, which can be dispersed great distances with agricultural and human activities, as well as by animals. Effective management of this species includes regular manual removal before seeds mature and enhancement of cover of desirable plant species can help prevent the establishment of Harding grass seedlings. This species has been rated by the Cal-IPC as “moderate” (Cal-IPC 2014).

California Annual Grasses: Pacific bentgrass (*Agrostis avenacea*), Cal-IPC Limited; wild oat grasses (*Avena fatua*, *A. barbata*), Cal-IPC Moderate; bromes (*Bromus diandrus*, *B. hordeaceus*), Cal-IPC Moderate and Limited, respectively; and Mediterranean barley (*Hordeum marinum ssp. gussoneanum*), Cal-IPC Moderate, are a mix of annual species in the grass family (Poaceae) which typically bloom throughout the spring and into the early summer, followed by senescence or dormancy in the summer and fall (Baldwin et al. 2012). These species are originally native to Europe and Africa, but are now known extensively throughout California. These grasses disperse readily and can displace native species, particularly annual forbs, and perennial graminoids. Several of these species are utilized as forage by open range livestock in spring, but can become unpalatable following senescence. Additionally, annual thatch build up from these species can deter the growth of native forbs and can provide an ignition source for wildfire (Cal-IPC 2014). Non-native annual grasses have become a ubiquitous part of the California flora and are extremely difficult to control. Although it will not eliminate non-native

annual grasses, prescribed grazing is an effective tool for reducing the cover of non-native annual grasses, as well as for reducing thatch build-up.

3.4.2 Non-Native Wildlife

Non-native wildlife species found on the Study Area can impact biodiversity and are a potential factor in the reduced number of wildlife species observed. Species such as feral cat (*Felis catus*), as well as off-leash dogs and homeless encampments were observed on the Study Area during the site assessment. Feral cats are extremely effective predators of birds, including the California clapper rail. Off-leash dogs and humans within the Study Area increase disturbance levels and perceived predation risk by wildlife species which may reduce foraging and breeding success. Non-native wildlife species management considerations are discussed further in the following Section.

4.0 RESTORATION AND MANAGEMENT CONSIDERATIONS

The Study Area has been highly modified from its original condition, with the removal of tidal activity and the placement of large amounts of dredged material on the site starting in the 1950s. The resulting upland habitat has subsided in areas, creating seasonal wetland habitat where none previously existed. The upland and seasonal wetland habitats that have formed on the dredged material are dominated by non-native and invasive species and experience high levels of disturbance from people, off-leash dogs, and feral house cats. The highly modified, disturbed nature of the site provides ample potential for restoration.

The currently proposed restoration efforts are aimed at improving habitat for listed tidal marsh species such as California clapper rail and SMHM. To that effect, restoration efforts should aim to restore the natural tidal regime. Restoration of tidal activity through removal or limited breaching of the perimeter levee would restore connectivity between the tidal salt marsh habitat to the north and the south of the Study Area and would substantially increase the regional acreage of tidal salt marsh habitat. Re-creation of upper marsh and transition zones would provide habitat which is generally lacking within the region due development along the Bay. Due to the reduced frequency of tidal inundation in the upper marsh and transition zones, these areas provide ideal refugia during high tide for species such as California clapper rail and SMHM, in addition to providing habitat for species such as San Pablo song sparrow. However, upland areas also provide important high tide refugia for these species, and any restoration efforts should retain and enhance some area of upland habitat for use by wildlife species during extreme tides.

Creation of seasonal wetland habitat within the transition zone and the lower elevations of the uplands would serve to increase habitat diversity and may increase the value of these areas for shorebirds as well as other types of birds that utilize seasonal wetland habitat. In addition, the creation of seasonal wetlands within these areas allows for the development of salt pannes, mudflats, upper marsh, and transitional areas as sea levels rise. This strategy is being employed to create resiliency in many tidal salt marsh restorations in California and elsewhere.

Within the context of restoring tidal salt marsh habitat for the benefit of listed species such as California clapper rail and SMHM, and creating seasonal wetland in the transition and upland areas, specific restoration and management considerations are provided in the following sections.

4.1 Wetlands and Waters

The Study Area contains wetlands and non-wetland waters potentially subject to federal or state jurisdiction under Section 404 and 401 of the CWA, Section 10 of the Rivers and Harbors Act, the Porter-Cologne Water Quality Control Act, and Section 1600 of the California Fish and Game Code. Impacts to jurisdictional wetlands or non-wetland waters will require regulatory permits from the Corps, the RWQCB, and possibly the CDFW, even if impacts may be beneficial and result in the creation, restoration, or enhancement of wetland habitat. Additionally, the Study Area contains lands in the east that are regulated by the San Francisco Bay Conservation and Development Commission (BCDC) and would require a regulatory permit for any impacts within their jurisdictional limits. The Study Area is subject to a public access easement, which may limit the potential for returning the entire site to tidal salt marsh habitat.

4.1.1 Wetlands

Outboard of the perimeter levee, the Project contains tidal salt marsh habitat, primarily represented by middle and low marsh zones dominated by pickleweed and cordgrass. Due to the perimeter levee, high marsh and transition zones are significantly truncated or are absent altogether. Inboard of the perimeter levee, seasonal wetlands are dominated by pickleweed in the lowest lying areas which remain inundated the longest and by fat hen and brass buttons in the more shallow areas which remain inundated for a shorter period. In addition to containing high cover of invasive species, the seasonal wetlands on the Study Area are crisscrossed by informal trails, resulting in trampling from recreationalists and disturbance from both on- and off-leash dogs, reducing the value of these wetlands for wildlife. Restoration of tidal activity and re-creation of lower, middle, and upper marsh zones, as well as the transition zone, will improve the value of this habitat for California clapper rail and SMHM, as well as other wildlife species associated with tidal salt marsh. Specific restoration and management recommendations include the following:

- Removal of berms, construction of tide inlets, contouring of the soils to restore the natural topography, and other modifications to restore tidal hydrological processes.
- Relocation (re-creation) of a portion of the seasonal wetland habitat from areas to be restored to tidal marsh habitat.
- Restoration and enhancement measures including seeding or planting with native wetland species.
- Invasive weed removal measures, including monitoring and management to prevent re-establishment.
- Limitation of public access within wetland habitats; may require relocation of public access easement and fencing of sensitive habitat areas to prevent access by the public or their pets.
- Monitoring and implementation of maintenance measures to ensure successful restoration activities.

4.1.2 Tidal Channels

The entirety of the Study Area is located in diked areas that were former baylands along the margins of the San Francisco Bay. Historically, these lands were tidally influenced wetlands but

were isolated from tidal influence by levees built to reclaim these areas for use in agriculture and other purposes. Restoration efforts should aim to restore tidal connection and to re-create a network of tidal channels to support California clapper rail and other birds that utilize tidal channels. Specific restoration and management recommendations include the following:

- Remove levees to restore tidal connection and re-create low, middle, and high marsh and transition zones.
- Re-establish a network of tidal channels to support tidal activity and to improve connectivity for California clapper rail and other bird species that rely on tidal channels.
- Seeding or supplemental planting with native tidal salt marsh species to improve biodiversity and provide habitat for species such as California clapper rail or SMHM

4.2 Non-Sensitive Upland Communities

Some area of upland habitat is necessary to provide high tide refuge for wildlife during extreme high tides. Upland habitat is also necessary to provide public access. Any restoration efforts should aim to retain and enhance some area of upland habitat. A portion of this habitat may be dedicated for public access; however, some portion must also be protected if it is to provide value as an upland refuge for listed wildlife species. Specific restoration and management recommendations for upland habitat include the following:

- Retain (relocate if necessary) and enhance some area of upland habitat to be used as a high tide refuge for listed wildlife species.
- Implement invasive species removal/control and encourage development of native plant communities.
- Implement supplemental planting or seeding of native species to increase diversity and improve habitat for species such as California clapper rail or SMHM.
- Control public access and impose restrictions on off-leash dogs. This may require relocation of the public access easement and fencing of sensitive habitat areas to be dedicated for wildlife use.

4.3 Plant Species

4.3.1 Special-Status Plant Species

No special-status plant species were observed on the Study Area by WRA biologists. Focused pre-construction rare plant surveys are needed for proposed areas of project work to determine the presence and extent of rare plant species determined to have moderate to high potential to occur in the impacted areas of the Study Area (Section 3.3.1, Appendix B). These surveys are needed for Point Reyes birds beak and Marin knotweed and should occur between June and September within the tidal marsh habitat outboard of the perimeter levee. Restoration and management recommendations for special-status plant species will be formulated and refined pending the outcome of such surveys. However, general restoration and management recommendations for special-status species include the following:

- Implement focused pre-construction surveys during the peak blooming period for the two special-status plant species determined to have moderate to high potential to occur within the impacted areas of the Study Area. Surveys should focus on areas containing suitable tidal salt marsh habitat for these species that will be impacted.
- Conduct invasive species removal/control to reduce competitive pressure; however, herbicide applications, mechanical removal, etc. should avoid impacts to special-status species if found on the site.
- Restoration and enhancement of habitat for special-status plant species associated with tidal salt marsh.
- Avoidance of any special-status plant species, if present, during ground-disturbing activities.

4.3.2 Invasive Plant Species

Thirty-two invasive plant species listed by the Cal-IPC (2014) were documented within the Study Area, with 20 posing a substantial threat to native species and ecosystems (i.e., species with Cal-IPC ratings of “moderate” or “high”). Invasive species can alter the fire regime and intensity, contribute to erosion, alter soil moisture regimes, compete with native plant species, and alter habitat for wildlife species. Restoration and management recommendations for invasive plant species include the following:

- Removal and management of invasive species to reduce competitive pressure and erosion, especially in sensitive terrestrial vegetation alliances.
- Restoration and enhancement of native plant communities suitable for supporting listed species such as California clapper rail or SMHM.

4.4 Wildlife Species

4.4.1 Special-Status Wildlife Species

Three wildlife species listed under the Federal Endangered Species Act and the California Endangered Species Act were either observed on the site or determined to have moderate to high potential to be present on the Study Area: California clapper rail, California black rail, and SMHM. In addition, special-status bird species and birds protected under the Migratory Bird Treaty Act may nest within the Study Area. Restoration and management recommendations for listed species and nesting birds include the following:

- Implement restoration efforts aimed at improving habitat for California clapper rail, California black rail, and SMHM, including restoration of tidal activity and the development of upper marsh and transition zones.
- Retain and enhance some portion of upland habitat for use by special-status wildlife species as a refuge during high tides.
- Control public access and impose restrictions on off-leash dogs. This may require relocation of the public access easement and fencing of sensitive habitat areas to be dedicated for wildlife use.

- If vegetation maintenance, vegetation clearing, or other large-scale activities occur during the nesting season (February 15 to August 31), it is recommended that nesting bird surveys be conducted to identify any active bird nests. An exclusion buffer should be established around active nests of special-status bird species or those protected under the Migratory Bird Treaty Act, with the buffer radius to be determined by a qualified biologist dependent upon bird species and activities conducted in the vicinity of the nest.
- If California clapper rail or California black rail nesting occurs on or adjacent to the Study Area, active nests during the breeding season (roughly March through July) should be protected from construction activities by exclusion buffers of up to approximately 650 feet in radius.
- If present, SMHM may use pickleweed marsh as well as suitable upland habitats near pickleweed marsh. Recommended measures to be implemented during potential vegetation management or restoration activities may include the use of qualified biological monitors during vegetation maintenance, vegetation clearing activities, and use of heavy equipment near suitable habitats; as well as limited use of mechanical equipment for vegetation maintenance and the use of wildlife exclusion fencing.

4.4.2 Wildlife Biodiversity

Enhancement of tidal salt marsh habitat will improve nesting and foraging habitat for native wildlife species such as California clapper rail, California black rail, and SMHM. In addition, establishing upper marsh and transition habitats and enhancing upland and seasonal wetland habitats should also increase the diversity of native bird species in the Study Area by increasing diversity of habitats, providing more effective cover, and decreasing the potential for use and disturbance by humans. Restoration and management recommendations for non-native wildlife species and wildlife biodiversity include the following:

- Preservation/enhancement of pickleweed, salt marsh, and tidal slough habitats will likely improve foraging habitat for California clapper rail and SMHM.
- Enhancement of upper marsh and upland habitat will improve refuge for SMHM, California clapper rail, California black rail, and other marsh-associated bird species such as San Pablo song sparrow and San Francisco common yellowthroat.
- Existing easements grant public access to the perimeter to the Study Area. Reconfiguring public access points and installing fencing to limit the accessible areas by humans and off-leash dogs within the Study Area is likely to benefit bird species and sensitive habitats. A lower disturbance level may increase the diversity of bird species nesting on the Study Area and as well as use by birds during migration.
- Management of the feral cat population will decrease predation risk on birds and small mammals within the Study Area. A trapping program is recommended to manage feral cats. Reduced predation risk may increase the number and diversity of birds nesting and inhabiting the Study Area.

- Restoration and/or enhancement of seasonal wetlands and grassland habitats within the Study Area is likely to increase the functions and values of habitat, which will benefit wildlife overall.

4.4.3 Dispersal Corridors

The Study Area is part of a mosaic of wetland habitats within the Estuary that function as an important landscape linkage for bird species by providing resting and foraging habitat during migration along the Pacific Flyway. Restoration of tidal salt marsh habitat, including upper marsh and transition zones, would substantially increase the regional availability of this habitat. Connectivity for local non-avian tidal salt marsh species would be improved through habitat enhancement and restoration activities which increase the amount of tidal salt marsh habitat and create a network of tidal channels. Any restoration efforts should include some component of upland habitat restoration or enhancement as a means of providing a high tide refuge. Restoration and management recommendations for dispersal and movement corridors include the following:

- Restoration of tidal salt marsh habitat within the Study Area will substantially increase the regional availability of this habitat type for tidal salt marsh-associated species that migrate along the Pacific Flyway.
- Restoration/enhancement of pickleweed and tidal marsh habitats will enhance local, fine-scale movement corridors within the Study Area for wildlife and increase connectivity within the CMMER.
- Reconfiguring public access points and installing fencing to limit the accessible areas by humans and off-leash dogs within the Study Area is likely to also benefit movement of wildlife species. Lower disturbance levels may lower the perceived predation risk by wildlife and increase wildlife movement within the Study Area.

5.0 REFERENCES

- Baldwin, BG, DH Goldman, DJ Keil, R Patterson, TJ Rosatti, and DH Wilken (eds.). 2012. The Jepson Manual: Vascular Plants of California, second edition. University of California Press, Berkeley, CA.
- Beier, P 1992. A checklist for evaluating impacts to wildlife movement corridors. *Wildlife Society Bulletin* 20: 434-440.
- Brenzel, Kathleen Norris, ed. *Sunset Western Garden Book*. New York: Sunset /Sunset Corporation, 2007. Print.
- Calflora. 2014. Calflora database. Accessed online at Calflora.org in August 2014.
- [Cal-IPC] California Invasive Plant Council. 2014. California Invasive Plant Inventory: Cal-IPC Publication 2006-2. California Invasive Plant Council, Berkeley, CA. Online at: <http://www.cal-ipc.org/ip/inventory/index.php>. Accessed August 2014

- [CDFA] California Department of Agriculture. 2013. Encyclopedic data sheets. Accessed online at http://www.cdfa.ca.gov/plant/ipc/weedinfo/wininfo_Table-commname.htm in February 2013.
- [CDFW] California Department of Fish and Wildlife. 2014. California Natural Diversity Database (CNDDDB), Wildlife and Habitat Data Analysis Branch. Sacramento. Accessed: July 2013.
- [CDFG] California Department of Fish and Game. 2010. List of Vegetation Alliances and Associations. Vegetation Classification and Mapping Program. Sacramento, California. September 2010. Accessed online at http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_list.asp in February 2013.
- [CNPS] California Native Plant Society. 2014a. Electronic Inventory of Rare and Endangered Vascular Plants of California. California Native Plant Society, Sacramento, California. Online at: <http://www.cnps.org/inventory>. Accessed August 2014.
- [CNPS] California Native Plant Society. 2014b. Locally Rare Plants. Accessed online at https://cnps.org/cnps/rareplants/locally_rare.php Accessed August 2014.
- [CSRL] California Soil Resources Lab. 2014. Online Soil Survey. Online at: <http://casoilresource.lawr.ucdavis.edu/drupal>. Accessed: August 2014.
- Dunk, J.R. 1995. White-tailed Kite (*Elanus leucurus*). In The Birds of North America, No. 178 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.
- DiTomaso, J. M. and E. A. Healy. 2007. Weeds of California and other Western States. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 3488.
- Eddleman, W.R., R.E. Flores, and M.L. Legare. 1994. Black Rail (*Laterallus jamaicensis*). In The Birds of North America, No. 123 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- [EDR] Environmental Data Resources Inc. 2014. EDR Aerial Photo Decade Package. Redwood Highway, Corte Madera, California 94925 Inquiry Number: 4000317.2s 2014. July.
- Fisler, G.F. 1965. Adaptations and speciation in harvest mice of the marshes of San Francisco Bay. University of California Publications in Zoology 77: 1-108.
- Forman, R.T.T. 1995. Land Mosaics: The ecology of landscapes and regions. Cambridge: University of Cambridge.
- Geissel, W.H., H. Shellhammer, and H.T. Harvey. 1988. The ecology of the salt marsh harvest mouse (*Reithrodontomys raviventris*) in a diked salt marsh. Journal of Mammalogy 69: 696-703.
- Google Earth. 2014. Aerial imagery acquired from publically available software.
- Harvey, T.E. 1988. Breeding Biology of the California Clapper Rail in South San Francisco Bay. 1988 Transactions of the Western Section of the Wildlife Society 24:98-104.

- Hilty, J.A., W.Z. Lidicker Jr., and A.M. Merenlender. 2006. Corridor Ecology: The Science and Practice of Linking Landscapes for Biodiversity Conservation. Island Press, Washington D.C.
- Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. State of California, The Resources Agency, Nongame Heritage Program, Department of Fish and Game, Sacramento, CA.
- Jennings, M.R. and M.P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final report submitted to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California. Contract No. 8023. November.
- Jepson Flora Project (eds.). 2014. Jepson eFlora. Online at: <http://ucjeps.berkeley.edu/IJM.html>; accessed October, 2014.
- Lichvar, Robert W. and Lindsey Dixon. 2007. Wetland Plants of Specialized Habitats in the Arid West. Cold Regions Research and Engineering Laboratory, U.S. Army Engineer Research and Development Center. Prepared for the U.S. Army Corps of Engineers Wetland Regulatory Assistance Program. 37 pp.
- Lichvar, RW 2012. The National Wetland Plant List. ERDC-CRREL_TR-12-11_NWPL. Online at: <http://rsgisias.crrel.usace.army.mil/NWPL>; accessed August 2014.
- MacWhirter, R. B., and K. L. Bildstein. 1996. Northern Harrier (*Circus cyaneus*). In The Birds of North America, No. 210 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.
- Marin Audubon Society. 2014. 72 Acres in Corte Madera. The Clapper Rail. Vol. 56, No. 9, May.
- NatureServe. 2014. NatureServe Conservation Status. Available online at: <http://www.natureserve.org/explorer/ranking>.
- Olofson Environmental. Inc. California Clapper Rail Surveys for the San Francisco Estuary Invasive Spartina Project 2013. Prepared for the State Coastal Conservancy. November 2013.
- [PBCS] Point Blue Conservation Science. 2014. 2013 Annual Report to U.S. Fish and Wildlife Service: California Clapper Rail (*Rallus longirostris obsoletus*). Submitted to U.S. Fish and Wildlife Service, Sacramento Field Office, January 8, 2014.
- Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens. 2009. A Manual of California Vegetation, Second Edition. California Native Plant Society in collaboration with California Department of Fish and Game. Sacramento, CA.
- Shellhammer, H.S., Jackson, R., Davilla, W., Gilroy, A.M., Harvey, H.T., and Simons, L. 1982. Habitat Preferences of Salt Marsh Harvest Mice (*Reithrodontomys raviventris*). The Wasmann Journal of Biology 40(1-2) pp. 102-144.
- Shuford, W.D. 1993. The Marin County Breeding Bird Atlas: A Distributional and Natural History of Coastal California Birds. California Avifauna Series 1. Bushtit Books, Bolinas, CA.

- Shuford, W.D. and T. Gardali, eds. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
- Smith, J. P. 2013. Holcus, in Jepson Flora Project (eds.) Jepson eFlora, http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=28335, accessed on Aug 27 2014
- Soulé, M.E. and J. Terbough. 1999. Conserving nature at regional and continental scales - a scientific program for North America. *Bioscience* 49:809-817.
- Stebbins, R.C. 2003. A Field Guide to Western Reptiles and Amphibians, Third Edition. Houghton Mifflin Company, Boston, MA and New York, NY.
- Sustaita, D, L Barthman-Thompson, P Quickert, L Patterson, and S Estrella. 2005. Annual Salt Marsh Harvest Mouse Demography and Habitat Use in Suisun Marsh Conservation Areas. Presentation at the CALFED Science Conference.
- Sustaita, D, PF Quickert, L Patterson, L Barthman-Thompson, S Estrella. 2011. Salt Marsh Harvest Mouse Demography and Habitat Use in the Suisun Marsh, California. *The Journal of Wildlife Management* 75(6): 1498-1507.
- [USDA] U.S. Department of Agriculture. 2014a. Official Soil Series Descriptions. Available online: <https://soilseries.sc.egov.usda.gov/osdname.asp>. Accessed August 2014.
- [USDA] U.S. Department of Agriculture. 2014b. Official List of US Hydric Soils.
- [USDA] U.S. Department of Agriculture. 2013. Soil Survey Marin County, California. In cooperation with the University of California Agricultural Experiment Station.
- [USGS] U.S. Geological Survey. 2012. San Rafael. 7.5-minute topographic map.
- [USFWS] U.S. Fish and Wildlife Service. 2013a. National Wetlands Inventory website. U.S. Department of the Interior, USFWS, Washington D.C. Online at: <http://www.fws.gov/nwi>. Accessed: February 2013.
- [USFWS] U.S. Fish and Wildlife Service. 2014b. Endangered species lists. Accessed online at <http://www.fws.gov/endangered/> in July 2014.
- [WRA] WRA, Inc. 2013. Delineation of Potential Jurisdictional Wetlands and Non-Wetland Waters Under Section 404 of the Clean Water Act, Porter-Cologne Water Quality Control Act, and Section 1600 of the California Fish and Game Code. Los Angeles County, California. February 2013.
- Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White. 1990. California's Wildlife, Volume I-III: Amphibians and Reptiles, Birds, Mammals. California Statewide Wildlife Habitat Relationships System, California Department of Fish and Game, Sacramento.

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APPENDIX A

PLANT AND WILDLIFE SPECIES OBSERVED IN THE STUDY AREA

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Appendix A-1. Plant species observed in the Study Area

SPECIES	ORIGIN	RARITY STATUS	INVASIVE STATUS	WETLAND STATUS AW (2014)
Silver wattle <i>Acacia dealbata</i>	non-native	--	moderate	NL
Blackwood acacia <i>Acacia melanoxylon</i>	non-native	--	limited	NL
Pacific bentgrass <i>Agrostis avenacea</i>	non-native	--	limited	FACW
Fat hen <i>Atriplex prostrata</i>	non-native	--	--	FACW
Slender oat <i>Avena barbata</i>	non-native	--	moderate	NL
Wild oat <i>Avena fatua</i>	non-native	--	moderate	NL
Coyote brush <i>Baccharis pilularis</i>	native	--	--	NL
Saltmarsh bulrush <i>Bolboschoenus maritimus</i> ssp. <i>paludosus</i>	native	--	--	OBL
Black mustard <i>Brassica nigra</i>	non-native	--	moderate	NL
Ripgut brome <i>Bromus diandrus</i>	non-native	--	moderate	NL
Soft chess <i>Bromus hordeaceus</i>	non-native		limited	FACU
Bull thistle <i>Cirsium vulgare</i>	non-native	--	moderate	FACU
Pampas grass <i>Cortaderia jubata</i>	non-native	--	high	FACU
Common brassbuttons <i>Cotula coronopifolia</i>	non-native	--	limited	OBL
California oatgrass <i>Danthonia californica</i>	native	--	--	FACU
Saltgrass <i>Distichlis spicata</i>	native	--	--	FAC
Common spikerush <i>Eleocharis macrostachya</i>	native	--	--	OBL

SPECIES	ORIGIN	RARITY STATUS	INVASIVE STATUS	WETLAND STATUS AW (2014)
Beardless wild rye <i>Elymus triticoides</i>	native	--	--	FAC
Italian rye grass <i>Festuca perennis</i>	non-native	--	moderate	FAC
Fennel <i>Foeniculum vulgare</i>	non-native	--	high	NL
Alkali heath <i>Frankenia salina</i>	native	--	--	FACW
French broom <i>Genista monspessulana</i>	non-native	--	high	NL
Oregon gumweed <i>Grindelia stricta</i> var. <i>platyphylla</i>	native	--	--	FACW
Bristly ox-tongue <i>Helminthotheca echioides</i>	non-native	--	limited	FACU
Toyon <i>Heteromeles arbutifolia</i>	native	--	--	NL
Common velvet grass <i>Holcus lanatus</i>	non-native	--	moderate	FAC
Mediterranean barley <i>Hordeum marinum</i> ssp. <i>gussoneanum</i>	non-native	--	moderate	FAC
Hairy catsear <i>Hypochaeris radicata</i>	non-native	--	moderate	FACU
Toad rush <i>Juncus bufonius</i> var. <i>bufonius</i>	native	--	--	FACW
Prickly lettuce <i>Lactuca serriola</i>	non-native	--	assessed	FACU
Hawkbit <i>Leontodon saxatilis</i>	non-native	--	--	FACU
Perennial pepperweed <i>Lepidium latifolium</i>	non-native	--	high	FAC
Bird's-foot trefoil <i>Lotus corniculatus</i>	non-native	--	assessed	FAC
Hyssop loosestrife <i>Lythrum hyssopifolia</i>	non-native	--	moderate	OBL

SPECIES	ORIGIN	RARITY STATUS	INVASIVE STATUS	WETLAND STATUS AW (2014)
Coast tarweed <i>Madia sativa</i>	native	--	--	NL
Bull mallow <i>Malva nicaeensis</i>	non-native	--	--	NL
Pineapple weed <i>Matricaria discoidea</i>	non-native	--	--	FACU
Lollypop tree <i>Myoporum laetum</i>	non-native	--	moderate	FACU
Olive <i>Olea europaea</i>	non-native	--	limited	NL
Harding grass <i>Phalaris aquatica</i>	non-native	--	moderate	FACU
Monterey pine <i>Pinus radiata</i>	native	--	limited	NL
Dooryard knotweed <i>Polygonum aviculare</i> ssp. <i>depressum</i>	non-native	--	--	FACW
Dooryard knotweed <i>Polygonum aviculare</i> ssp. <i>neglectum</i>	non-native	--	--	FACW
Dooryard knotweed <i>Polygonum aviculare</i> ssp. <i>rurivagum</i>	non-native	--	--	FACW
Rabbit's-foot grass <i>Polypogon monspeliensis</i>	non-native	--	limited	FACW
Narrowleaf firethorn <i>Pyracantha angustifolia</i>	non-native	--	limited	NL
Callery pear <i>Pyrus calleryana</i>	non-native	--	--	NL
Coast live oak <i>Quercus agrifolia</i> var. <i>agrifolia</i>	native	--	--	NL
Valley oak <i>Quercus lobata</i>	native	--	--	FACU
Wild radish <i>Raphanus sativus</i>	non-native	--	limited	NL

SPECIES	ORIGIN	RARITY STATUS	INVASIVE STATUS	WETLAND STATUS AW (2014)
Himalayan blackberry <i>Rubus armeniacus</i>	non-native	--	high	FACU
Curly dock <i>Rumex crispus</i>	non-native	--	limited	FAC
Pacific swampfire <i>Salicornia pacifica</i>	native	--	--	OBL
Verrucose seapurslane <i>Sesuvium verrucosum</i>	native	--	--	FACW
Cordgrass <i>Spartina foliosa</i>	native	--	--	OBL
Red sandspurry <i>Spergularia rubra</i>	non-native	--	--	FAC
Poison oak <i>Toxicodendron diversilobum</i>	native	--	--	NL
Rough cocklebur <i>Xanthium strumarium</i>	native	--	--	FAC

Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. The National Wetland Plant List: 2014 Update of Wetland Ratings. *Phytoneuron* 2014-41: 1-42.

Appendix A-2. Wildlife species identified in the Study Area

COMMON NAME	SCIENTIFIC NAME
Mammals	
Raccoon (scat)	<i>Procyon lotor</i>
Black-tailed jackrabbit	<i>Lepus californicus</i>
House cat (feral)	<i>Felis catus</i>
Tree squirrel species (nests)	<i>Sciurus</i> spp.
Birds	
Turkey vulture	<i>Cathartes aura</i>
California clapper rail	<i>Rallus longirostris obsoletus</i>
Snowy egret	<i>Egretta thula</i>
Western gull	<i>Larus occidentalis</i>
Great egret	<i>Ardea alba</i>
Mourning dove	<i>Zenaida macroura</i>
Rock pigeon	<i>Columba livia</i>
Anna's hummingbird	<i>Calypte anna</i>
Black phoebe	<i>Saynoris nigracans</i>
Common raven	<i>Corvus corax</i>
Violet-green swallow	<i>Tachycineta thalassina</i>
Cliff swallow	<i>Petrochelidon fulva</i>
Barn swallow	<i>Hirundo rustica</i>
Bushtit	<i>Psaltriparus minimus</i>
Song sparrow	<i>Melospiza melodia</i>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>
House finch	<i>Carpodacus mexicanus</i>
Invertebrates	
Swallowtail butterfly	<i>Papilio</i> spp.

APPENDIX B

POTENTIAL FOR SPECIAL-STATUS PLANT AND WILDLIFE SPECIES
TO OCCUR IN THE STUDY AREA

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Appendix B. Potential for special-status species to occur in the Study Area. List compiled from the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CDFW 2014), U.S. Fish and Wildlife Service (USFWS) Species Lists, and the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants. Database searches focused on the San Rafael, San Quentin, Novato, Petaluma Point, Point Bonita, and San Francisco North U.S. Geological Survey 7.5 minute quadrangles, and other CDFW lists and publications.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Plants				
Napa false indigo <i>Amorpha californica</i> var. <i>napensis</i>	Rank 1B.2	Openings in broadleaf upland forest, chaparral, cismontane woodland. Elevation range: 395 – 6,560 feet. Blooms: April – July.	No Potential. The Study Area does not contain suitable habitat to support this species such as elevations greater than 395 feet, openings in broadleaf upland forest, chaparral, or cismontane woodland.	No further surveys are recommended.
Bent-flowered fiddleneck <i>Amsinckia lunaris</i>	Rank 1B.2	Cismontane woodland, valley and foothill grassland, coastal bluff scrub. Elevation range: 10 – 1,625 feet. Blooms: March – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland and woodland habitats; however, the high density of invasive species and high levels of disturbance at the site limit the potential for occurrence.	No further surveys are recommended.
Coast rockcress <i>Arabis blepharophylla</i>	Rank 4.3	Broadleaf upland forest, coastal bluff scrub, coastal prairie, coastal scrub; located on rocky sites, often on coastal bluffs. Elevation range: 10 – 3,575 feet. Blooms: February – May.	No Potential. The Study Area does not contain suitable habitat to support this species such as broadleaf upland forest, coastal bluff scrub, coastal prairie, or coastal scrub.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Franciscan manzanita <i>Arctostaphylos franciscana</i>	Rank 1B.1	Serpentine substrates in coastal scrub. Occurs at elevations ranging from 60 to 300 meters. Blooming Period: February - April.	No Potential. The Study Area does not contain suitable habitat to support this species such as serpentine substrates or coastal scrub habitat.	No further surveys are recommended.
Mt. Tamalpais manzanita <i>Arctostaphylos montana</i> <i>ssp. montana</i>	Rank 1B.3	Chaparral, valley and foothill grassland; on rocky serpentine slopes in scrub and grassland. Elevation range: 520 – 2,470 feet. Blooms: February – April.	No Potential. The Study Area does not contain serpentine substrates or appropriate elevations to support this species. While it may contain marginally suitable habitat elements such as grassland habitats, the high density of invasive species and high levels of disturbance at the site preclude the potential for occurrence.	No further surveys are recommended.
Presidio manzanita <i>Arctostaphylos montana</i> <i>ssp. ravenii</i>	FE, SE, Rank 1B.1	Serpentine outcrop in chaparral, coastal prairie, coastal scrub. Occurs at elevations ranging from 45 to 215 meters. Blooming Period: February - March.	No Potential. The Study Area does not contain suitable habitat to support this species such as serpentine outcrops or chaparral, coastal prairie, and coastal scrub habitats.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Marin manzanita <i>Arctostaphylos virgata</i>	Rank 1B.2	Broadleaf upland forest, closed-cone coniferous forest, chaparral, North Coast coniferous forest; on sandstone and granitic substrates. Elevation range: 195 – 2,275 feet. Blooms: January – March.	No Potential. The Study Area does not contain suitable habitat to support this species such as sandstone or granitic substrates, nor does it contain broadleaf or coniferous forest, or chaparral habitats.	No further surveys are recommended.
Marsh sandwort <i>Arenaria paludicola</i>	FE, SE, Rank 1B.1	Sandy openings in freshwater or brackish marshes and swamps. Occurs at elevations ranging from 3 to 170 meters. Blooming Period: May - August.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as freshwater or brackish marsh; however, it does not contain sandy substrates and the high density of invasive species and high levels of historical disturbance at the site limit the potential for occurrence. Additionally, only one documented occurrence exists for this species within the greater vicinity, from an unknown location in Northern San Francisco quadrangle from 2009.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Carlotta Hall's lace fern <i>Aspidotis carlotta-halliae</i>	Rank 4.2	Usually serpentine substrates in chaparral, cismontane woodland. Occurs at elevations ranging from 100 to 1,400 meters.	Unlikely. The Study Area does not contain suitable habitat to support this species such as serpentine substrates or chaparral habitats, however it does contain highly degraded woodland habitat. The high density of invasive species in this woodland habitat and high levels of disturbance at the site limit the potential for occurrence.	No further surveys are recommended.
Brewer's milk-vetch <i>Astragalus breweri</i>	Rank 4.2	Chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland; typically located on open gravelly sites underlain by serpentine or volcanic substrates. Elevation range: 290 – 2,375 feet. Blooms: April – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland and woodland habitats; however, both habitats are of degraded quality and the high density of invasive species and high levels of disturbance at the site limit the potential for occurrence.	No further surveys are recommended.
Ocean bluff milk-vetch <i>Astragalus nuttallii</i> var. <i>nuttallii</i>	Rank 4.2	Coastal bluff scrub, coastal dunes. Elevation range: 10 – 390 feet. Blooms: January – November.	No Potential. The Study Area does not support suitable habitat for this species, including coastal bluff scrub or coastal dunes.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Alkali milk-vetch <i>Astragalus tener</i> var. <i>tener</i>	Rank 1B.2	Playas, vernal pools, valley and foothill grassland; located in mesic grassy areas on alkaline substrate. Elevation range: 0 – 195 feet. Blooms: March – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland habitat is of degraded quality with a high density of invasive species and high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Serpentine reed grass <i>Calamagrostis ophitidis</i>	Rank 4.3	Chaparral, lower montane coniferous forest, meadows and seeps, valley and foothill grassland; located in openings, often north-facing, underlain by rocky serpentine substrate. Elevation range: 290 – 3,465 feet. Blooms: April – July.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland habitat is not underlain by rocky serpentine substrate, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Brewer's calandrinia <i>Calandrinia breweri</i>	Rank 4.2	Chaparral, coastal scrub; located on sandy or loamy substrate in areas often recently disturbed or burned. Elevation range: 30 – 3,965 feet. Blooms: March – June.	No Potential. The Study Area does not contain suitable habitat such as chaparral or coastal scrub to support this species.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Tiburon mariposa lily <i>Calochortus tiburonensis</i>	FT, ST, Rank 1B.1	Valley and foothill grassland; located on open, grassy or rocky slopes derived from serpentine. Elevation range: 160 – 490 feet. Blooms: March – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland habitat is not underlain by rocky serpentine substrate, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Oakland star-tulip <i>Calochortus umbellatus</i>	Rank 4.2	Broadleaf upland forest, chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland; located on serpentine substrates. Elevation range: 325 – 2,275 feet. Blooms: March – May.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland and woodland habitats; however, both of these habitats are not underlain by serpentine substrates, are of degraded quality with a high density of invasive species, and have high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Bristly sedge <i>Carex comosa</i>	Rank 2B.1	Typically on lake and pond margins in coastal prairie, marshes and swamps, valley and foothill grassland. Elevation range: 0 – 425 feet. Blooms: May – September.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, this is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence. Additionally, brackish marsh present within the Study Area is too saline to support this species and closest documented occurrence is from an unknown location in Northern San Francisco quadrangle from 2009.	No further surveys are recommended.
Tiburon paintbrush <i>Castilleja affinis</i> var. <i>neglecta</i>	FE, ST, Rank 1B.2	Valley and foothill grassland; located in grassy, open areas and rock outcrops underlain by serpentine substrate. Elevation range: 195 – 1,300 feet. Blooms: April – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, this is not underlain by serpentine substrate, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Johnny-nip <i>Castilleja ambigua</i> var. <i>ambigua</i>	Rank 4.2	Coastal bluff scrub, coastal prairie, coastal scrub, marshes and swamps, valley and foothill grassland, vernal pool margins. Elevation range: 0 – 1,415 feet. Blooms: March – August.	Unlikely. While the Study Area contains marginal grassland habitat, it is highly degraded, contains a high density of invasive species, and is heavily disturbed, all of which limit the potential for occurrence. The Study Area also contains marsh habitat that may be suitable to support this species. However, because the closest documented occurrence is from 1900, located approximately 7 miles east in Point Richmond, the potential for this species to occur within the Study Area is limited.	No further surveys are recommended.
Glory brush <i>Ceanothus gloriosus</i> var. <i>exaltatus</i>	Rank 4.3	Chaparral. Elevation range: 90 – 1985 feet. Blooms: March – August.	No Potential. The Study Area does not contain suitable habitat to support this species such as chaparral.	No further surveys are recommended.
Kern ceanothus <i>Ceanothus pinetorum</i>	Rank 4.3	Lower montane coniferous forest, subalpine forest, upper montane coniferous forest; located on rocky areas of granitic rock. Elevation range: 5200 – 8,925 feet. Blooms: May – July.	No Potential. The Study Area does not contain suitable habitat for this species, such as coniferous or subalpine forests, nor does it contain rocky areas with granitic rock.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Monterey ceanothus <i>Ceanothus rigidus</i>	Rank 4.2	Sandy substrates in closed-cone coniferous forest, chaparral, coastal scrub. Elevation range: 10 - 1,804 feet. Blooming Period: February - June.	No Potential. The Study Area does not contain suitable habitat for this species, such as coniferous forest, chaparral, or coastal scrub.	No further surveys are recommended.
Point Reyes bird's-beak <i>Chloropyron maritimum</i> <i>ssp. palustre</i>	Rank 1B.2	Coastal salt marshes; located in low-growing saltgrass and pickleweed mats. Elevation range: 0 – 33 feet. Blooms: June – October.	High Potential. The Study Area contains suitable habitat to support this species, including coastal salt marsh comprised of saltgrass and pickleweed mats. This species has been confirmed to occur approximately 3 miles south in 2014 and was documented to occur 0.3 mile north of the Study Area along pickleweed in 1987.	Protocol-level surveys are recommended in portions of the site containing elements of coastal salt marsh habitat. Surveys should be conducted between June and October.
San Francisco Bay spineflower <i>Chorizanthe cuspidata</i> var. <i>cuspidata</i>	Rank 1B.2	Coastal bluff scrub, coastal dunes, coastal prairie, coastal scrub; located on sandy substrates of terraces and slopes. Elevation range: 10 – 700 feet. Blooms: April – August.	No Potential. The Study Area does not contain suitable habitat for this species, such as coastal bluff scrub, coastal dunes, coastal prairies, coastal scrub, nor does it contain sandy substrates.	No further surveys are recommended.
Sonoma spineflower <i>Chorizanthe valida</i>	FE, SE, Rank 1B.1	Coastal prairie; in sandy soils. Elevation range: 35 – 1000 feet. Blooms: June – August.	No Potential. The Study Area does not contain suitable habitat for this species, such as coastal prairies or sandy substrates.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Franciscan thistle <i>Cirsium andrewsii</i>	Rank 1B.2	Coastal bluff scrub, broadleaf upland forest, coastal scrub; sometimes located along serpentine seeps. Elevation range: 0 – 490 feet. Blooms: March – July.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coastal bluff scrub, broadleaf forest, or coastal scrub.	No further surveys are recommended.
Mt. Tamalpais thistle <i>Cirsium hydrophilum</i> var. <i>vaseyi</i>	Rank 1B.2	Broadleaf upland forest, chaparral; located on streams and serpentine seeps in woodland and scrub habitat. Elevation range: 780 – 2015 feet. Blooms: May – August.	No Potential. The Study Area does not contain suitable habitat to support this species, such as broadleaf forest, chaparral, or streams and serpentine seeps in woodland or scrub habitat.	No further surveys are recommended.
Seaside cistanthe <i>Cistanthe maritima</i>	Rank 4.2	Sandy substrates in coastal bluff scrub, coastal scrub, and valley and foothill grassland. Elevation range: 16 - 984 feet. Blooming Period: February - August.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland present does not contain sandy substrates, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
<p>Presidio clarkia</p> <p><i>Clarkia franciscana</i></p>	FE, SE, Rank 1B.1	Coastal scrub, valley and foothill grassland; situated on serpentine outcrops in grassland and/or scrub. Elevation range: 80 – 1,090 feet. Blooms: May – July.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland present does not contain serpentine outcrops, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
<p>Round-headed Chinese-houses</p> <p><i>Collinsia corymbosa</i></p>	Rank 1B.2	Coastal dunes, coastal prairie. Elevation range: 0 – 65 feet. Blooms: April – June.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coastal dunes or coastal prairie.	No further surveys are recommended.
<p>San Francisco collinsia</p> <p><i>Collinsia multicolor</i></p>	Rank 1B.2	Closed-cone coniferous forest, coastal scrub; located on decomposed shale mixed with humus. Elevation range: 95 – 815 feet. Blooms: March – May.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coniferous forest or coastal scrub.	No further surveys are recommended.
<p>California lady's-slipper</p> <p><i>Cypripedium californicum</i></p>	Rank 4.2	Bogs and fens, lower montane coniferous forest; located along seeps and streambanks, typically underlain by serpentine. Elevation range: 95 – 8,940 feet. Blooms: April – August.	No Potential. The Study Area does not contain suitable habitat to support this species, such as bogs and fens, coniferous forest, seeps or streambanks, or serpentine substrates.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
California bottle-brush grass <i>Elymus californicus</i>	Rank 4.3	Broadleaf upland forest, cismontane woodland, North Coast coniferous forest, riparian woodland. Elevation range: 45 – 1530 feet. Blooms: May – November.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as woodland habitat; however, the woodland present does not contain serpentine outcrops, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Tiburon buckwheat <i>Eriogonum luteolum</i> var. <i>caninum</i>	Rank 1B.2	Chaparral, valley and foothill grassland, cismontane woodland, coastal prairie; located on sandy or gravelly substrate derived from serpentine. Elevation range: 0 – 2275 feet. Blooms: May – September.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as marginal woodland habitat; however, the woodland present does not contain sandy or gravelly substrate derived from serpentine, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Slender cottongrass <i>Eriophorum gracile</i>	Rank 4.3	Bogs and fens, meadows and seeps, upper montane coniferous forest; located in perennial acidic wetland habitat. Elevation range: 4,160 – 9,425 feet. Blooms: May – September.	No Potential. The Study Area does not contain suitable habitat to support this species, such as bogs and fens, meadows and seeps, coniferous forest, perennial acidic wetland habitat, or elevations greater than 4,000 feet above sea level.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
San Francisco wallflower <i>Erysimum franciscanum</i>	Rank 4.2	Maritime chaparral, coastal dunes, coastal scrub, valley and foothill grassland; typically located on serpentine or volcanic substrate, often on roadsides. Elevation range: 0 – 1,790 feet. Blooms: March – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland present does not occur on serpentine or volcanic substrates, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Minute pocket moss <i>Fissidens pauperculus</i>	Rank 1B.2	North Coast coniferous forest; located on damp soil along the coast, and in dry streambanks and streambeds. Elevation range: 30 – 3,330 feet.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coniferous forest or streams.	No further surveys are recommended.
Marin checker lily <i>Fritillaria lanceolata</i> var. <i>tristulis</i>	Rank 1B.1	Coastal bluff scrub, coastal scrub, coastal prairie; observed in canyons, riparian areas, and rock outcrops; often located on serpentine substrate. Elevation range: 45 – 490 feet. Blooms: February – May.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coastal bluff scrub, coastal scrub, coastal prairie, or riparian areas.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Fragrant fritillary <i>Fritillaria liliacea</i>	Rank 1B.2	Coastal scrub, valley and foothill grassland, coastal prairie, cismontane woodland; located in grassy sites underlain by clay, typically derived from volcanics or serpentine. Elevation range: 10 – 1,335 feet. Blooms: February – April.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland and woodland habitat; however, the non-native grassland and woodland present does not occur on serpentine or volcanic substrates, are of degraded quality with a high density of invasive species, and have high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Blue coast gilia <i>Gilia capitata</i> ssp. <i>chamissonis</i>	Rank 1B.1	Coastal dunes, coastal scrub. Elevation range: 5 – 600 feet. Blooms: April – July.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coastal dunes or coastal scrub.	No further surveys are recommended.
Woolly-headed gilia <i>Gilia capitata</i> ssp. <i>tomentosa</i>	Rank 1B.1	Coastal bluff scrub; rocky outcrops on the coast. Elevation range: 15 – 155 feet. Blooms: May – July.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coastal bluff scrub or rocky outcrops.	No further surveys are recommended.
Dark-eyed gilia <i>Gilia millefoliata</i>	Rank 1B.2	Coastal dune. Elevation range: 5 – 100 feet. Blooms: April – July.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coastal dune.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
San Francisco gumplant <i>Grindelia hirsutula</i> var. <i>maritima</i>	Rank 3.2	Coastal scrub, coastal bluff scrub, valley and foothill grassland; situated on sea bluffs underlain by sand substrate, often derived from serpentine. Elevation range: 45 – 1,300 feet. Blooms: June – September.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland present does not occur on sandy soils, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Diablo helianthella <i>Helianthella castanea</i>	Rank 1B.2	Broadleaf upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland; typically located in oak woodland/chaparral ecotone underlain by rocky, azonal substrates, often in partial shade. Elevation range: 195 – 4,225 feet. Blooms: March – June	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland and woodland habitat; however, the non-native grassland and acacia woodland present does not occur on rocky, azonal substrates, are of degraded quality with a high density of invasive species, and have high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
White seaside tarplant <i>Hemizonia congesta</i> ssp. <i>congesta</i>	Rank 1B.2	Coastal scrub, valley and foothill grassland. Elevation range: 65 – 1,840 feet. Blooms: April – October.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland present is of degraded quality with a high density of invasive species and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Marin western flax <i>Hesperolinon congestum</i>	FT, ST, Rank 1B.1	Chaparral, valley and foothill grassland; located on serpentine substrate. Elevation range: 15 – 1,205 feet. Blooms: April – July.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland present does not occur on serpentine substrate, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Water star-grass <i>Heteranthera dubia</i>	Rank 2B.2	Requires a pH of 7 or higher, usually in slightly eutrophic waters of marshes and swamps (alkaline, still or slow-moving water). Elevation range: 98 - 4,905 feet. Blooming Period: July - October.	Unlikely. While the Study Area contains marsh, waters are not alkaline or slow-moving.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Santa Cruz tarplant <i>Holocarpha macradenia</i>	FT, SE, Rank 1B.1	Coastal prairie, coastal scrub, valley and foothill grassland; located on light, sandy to sandy clay substrate; tolerant of non-native herbaceous vegetation. Elevation range: 30 – 715 feet. Blooms: June – October.	Unlikely. The Study Area contains marginal non-native grassland habitat underlain with clay substrates that exhibit high levels of disturbance, including recent burning, homeless encampments, and low levels of recreational use.	No further surveys are recommended.
Kellogg's horkelia <i>Horkelia cuneata</i> var. <i>sericea</i>	Rank 1B.1	Closed cone coniferous forest, coastal scrub, chaparral; located in openings on relict dunes and coastal sandhills. Elevation range: 30 – 650 feet. Blooms: April – September.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland is not located within openings of relict dunes, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Thin-lobed horkelia <i>Horkelia tenuiloba</i>	Rank 1B.2	Broadleaf upland forest, coastal scrub, valley and foothill grassland, chaparral; in mesic openings, on sandy substrate. Elevation range: 165 – 1,640 feet. Blooms: May – July.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland is not located in mesic openings or on sandy soils, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Coast iris <i>Iris longipetala</i>	Rank 4.2	Coastal prairie, lower montane coniferous forest, meadows and seeps; located on mesic sites. Elevation range: 0 – 1,950 feet. Blooms: March – May.	Unlikely. The Study Area does not contain suitable habitat to support this species, such as coastal prairie, coniferous forest, or meadows and seeps.	No further surveys are recommended.
Small groundcone <i>Kopsiopsis hookeri</i>	Rank 2B.3	North Coast coniferous forest; located in open woods, shrublands, generally hosts on salal (<i>Gaultheria shallon</i>). Elevation range: 290 – 2,880 feet. Blooms: April – August.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coniferous forest or shrublands.	No further surveys are recommended.
Beach layia <i>Layia carnosa</i>	FE, SE, Rank 1B.1	Coastal dunes; located in sparsely vegetated semi-stabilized dunes behind foredunes. Elevation range: 0 – 195 feet. Blooms: March – July.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coastal dunes.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Bristly leptosiphon <i>Leptosiphon acicularis</i>	Rank 4.2	Chaparral, cismontane woodland, coastal prairie, valley and foothill grassland; often located on shallow, rocky substrate in foothill positions. Elevation range: 175 – 4,875 feet. Blooms: April – July.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland is not located in mesic openings or on sandy soils, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Large-flowered leptosiphon <i>Leptosiphon grandiflorus</i>	Rank 4.2	Coastal bluff scrub, closed-cone coniferous forest, cismontane woodland, coastal dunes, coastal prairie, coastal scrub, valley and foothill grassland; typically on sandy substrate. Elevation range: 15 – 3,965 feet. Blooms: April – August.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland and woodland habitat; however, these habitats are not located on sandy soils, are of degraded quality with a high density of invasive species, and have high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Rose leptosiphon <i>Leptosiphon rosaceus</i>	Rank 1B.1	Coastal bluff scrub. Elevation range: 0 – 325 feet. Blooms: April – July.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coastal bluff scrub.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
San Francisco lessingia <i>Lessingia germanorum</i>	FE, SE, Rank 1B.1	Coastal dunes; located on open / bare areas underlain by sandy substrate on remnant coastal dunes. Elevation range: 80 – 360 feet. Blooms: June – November.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coastal dunes.	No further surveys are recommended.
Woolly-headed lessingia <i>Lessingia hololeuca</i>	Rank 3	Broadleaf upland forest, coastal scrub, lower montane coniferous forest, valley and foothill grassland; typically on clay, serpentine substrate. Elevation range: 3 – 2,885 feet. Blooms: April – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Tamalpais lessingia <i>Lessingia micradenia</i> var. <i>micradenia</i>	Rank 1B.2	Chaparral, valley and foothill grassland; typically located in serpentine grassland or serpentine scrub, often on roadsides. Elevation range: 325 – 1,625 feet. Blooms: June – October.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland does not encompass serpentine substrate, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
<p>Mt. Diablo cottonweed <i>Micropus amphibolus</i></p>	<p>Rank 3.2</p>	<p>Broadleaf upland forest, chaparral, cismontane woodland, valley and foothill grassland; typically on thin, rocky soils. Elevation range: 145 – 2,710 feet. Blooms: March – May.</p>	<p>Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland and woodland habitat; however, the non-native grassland is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.</p>	<p>No further surveys are recommended.</p>
<p>Marsh microseris <i>Microseris paludosa</i></p>	<p>Rank 1B.2</p>	<p>Closed-cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland. Elevation range: 15 – 975 feet. Blooms: April – June.</p>	<p>Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland and woodland habitat; however, these habitats are not located on rocky soils, are of degraded quality with a high density of invasive species, and have high levels of disturbance that limit the potential for occurrence. While this species was documented within close range of the Study Area, the record of occurrence is incomplete with an unknown observation date and unknown location.</p>	<p>No further surveys are recommended.</p>

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Baker's navarretia <i>Navarretia leucocephala</i> ssp. <i>bakeri</i>	Rank 1B.1	Wet, mesic sites underlain by adobe and/or alkaline substrate in cismontane woodland, meadows, seeps, vernal pools, valley and foothill grassland, lower montane coniferous forest. Elevation range: 15 – 5,710 feet. Blooms: April – July.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland and woodland habitat; however, the non-native grassland and woodland is not located on rocky soils, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Marin County navarretia <i>Navarretia rosulata</i>	Rank 1B.2	Closed-cone coniferous forest, chaparral; located on dry, rocky sites often formed from serpentine. Elevation range: 650 – 2,065 feet. Blooms: May – July.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coniferous forest or chaparral.	No further surveys are recommended.
White-rayed pentachaeta <i>Pentachaeta bellidiflora</i>	FE, SE, Rank 1B.1	Valley and foothill grassland; located on open, dry rocky slopes and grassy areas, often on substrate derived from serpentine. Elevation range: 110 – 2,015 feet. Blooms: March – May.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland does not encompass serpentine, rocky substrate, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Gairdner's yampah <i>Perideridia gairdneri</i> ssp. <i>gairdneri</i>	Rank 4.2	Broadleaf upland forest, chaparral, coastal prairie, valley and foothill grassland, vernal pools; located in vernal mesic sites. Elevation range: 0 – 1,985 feet. Blooms: June – October.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Michael's rein orchid <i>Piperia michaelii</i>	Rank 4.2	Coastal bluff scrub, closed-cone coniferous forest, chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest. Elevation range: 10 – 2,975 feet. Blooms: April – August.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as woodland habitat; however, this is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Choris' popcorn-flower <i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i>	Rank 1B.2	Chaparral, coastal scrub, coastal prairie; located in mesic sites. Elevation range: 45 – 520 feet. Blooms: March – June.	No Potential. The Study Area does not contain suitable habitat to support this species, such as chaparral, coastal scrub, or coastal prairie.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
San Francisco popcorn-flower <i>Plagiobothrys diffusus</i>	SE, Rank 1B.1	Valley and foothill grassland, coastal prairie; located on grassy slopes within marine influence. Elevation range: 195 – 1,170 feet. Blooms: March – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Hairless popcorn-flower <i>Plagiobothrys glaber</i>	Rank 1A	Meadows and seeps, marshes and swamps; located in coastal salt marshes and alkaline meadows. Elevation range: 16 to 591 feet. Blooms: March – May.	Unlikely. Although the Study Area contains coastal salt marsh, the species is thought to be extinct in California and is unlikely to occur on the Study Area.	No further surveys are recommended.
North Coast semaphore grass <i>Pleuropogon hooverianus</i>	ST, Rank 1B.1	Broadleaf upland forests, meadows and seeps, freshwater marshes and swamps, North Coast coniferous forest, shaded, wet, and grassy areas in forested habitat. Elevation range: 10 – 635 feet. Blooms May – August	Unlikely. While the Study Area contains marsh, waters are saline or brackish and marginal grassland habitat is densely vegetated by invasive species. Moreover, both habitats are degraded with high level of disturbance that limits the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Oregon polemonium <i>Polemonium carneum</i>	Rank 2B.2	Coastal prairie, coastal scrub, lower montane coniferous forest. Elevation range: 0 – 5,950 feet. Blooms: April – September.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coniferous forest or chaparral.	No further surveys are recommended.
Marin knotweed <i>Polygonum marinense</i>	Rank 3.1	Salt and brackish coastal marshes. Elevation range: 0 – 35 feet. Blooms: sometimes April, May – August, sometimes October.	Moderate Potential. The Study Area contains both salt and brackish coastal marsh habitat that have potential to support this species. While this species is presumed extant, it was documented in 1989 less than half a mile north of the Study Area, in coastal salt marsh.	Protocol-level surveys are recommended in portions of the site containing elements of salt and brackish marsh habitat. Surveys should be conducted between May and August.
Tamalpais oak <i>Quercus parvula</i> var. <i>tamalpaisensis</i>	Rank 1B.3	Lower montane coniferous forest; highly restricted to the slopes of Mt. Tamalpais. Elevation range: 325 – 2,275 feet. Blooms: March – April.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coniferous forest.	No further surveys are recommended.
Lobb's aquatic buttercup <i>Ranunculus lobbii</i>	Rank 4.2	Cismontane woodland, North Coast coniferous forest, valley and foothill grassland, vernal pools; located in mesic, vernal wet areas. Elevation range: 45 – 1,530 feet. Blooms: February – May.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland and woodland habitat; however, these habitats are not located in mesic, vernal wet areas, are of degraded quality with a high density of invasive species, and have high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Victor's gooseberry <i>Ribes victoris</i>	Rank 4.3	Broadleaf upland forest, chaparral; located in shady, mesic sites. Elevation range: 325 – 2,440 feet. Blooms: March – April.	No Potential. The Study Area does not contain suitable habitat to support this species, such as broadleaf forest or chaparral.	No further surveys are recommended.
Adobe sanicle <i>Sanicula maritima</i>	SR, Rank 1B.1	Meadows and seeps, valley and foothill grassland, chaparral, coastal prairie; located on moist clay substrate derived from ultramafic rock. Elevation range: 95 – 780 feet. Blooms: February – May.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Point Reyes checkerbloom <i>Sidalcea calycosa</i> ssp. <i>rhizomata</i>	Rank 1B.2	Marshes and swamps; located in freshwater marsh habitat near the coast. Elevation range: 10 – 245 feet. Blooms: April – September.	Unlikely. While the Study Area contains marsh habitat, it is brackish and exhibited characteristics of high salinity that limits the potential for occurrence of this species.	No further surveys are recommended.
Marin checkerbloom <i>Sidalcea hickmanii</i> ssp. <i>viridis</i>	Rank 1B.3	Chaparral; located on serpentine or volcanic substrate, often located in burns. Elevation range: 160 – 1,400 feet. Blooms: May – June.	No Potential. The Study Area does not contain suitable habitat to support this species, such as chaparral, serpentine or volcanic substrates.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
San Francisco campion <i>Silene verecunda</i> ssp. <i>verecunda</i>	Rank 1B.2	Coastal scrub, valley and foothill grassland, coastal bluff scrub, chaparral, coastal prairie; typically situated on mudstone or shale substrate, rarely on serpentine. Elevation range: 95 – 3,000 feet. Blooms: March – August.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland does not occur on mudstone or shale, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Santa Cruz microseris <i>Stebbinsoseris decipiens</i>	Rank 1B.2	Broadleaf upland forest, closed-cone coniferous forest, chaparral, coastal prairie, coastal scrub; located on open, loose or disturbed substrate derived from sandstone, shale, or serpentine. Elevation range: 30 – 1,625 feet. Blooms: April – May.	No Potential. The Study Area does not contain suitable habitat to support this species, such as broadleaf or coniferous forest, chaparral, coastal prairie or coastal scrub.	No further surveys are recommended.
Tamalpais jewel-flower <i>Streptanthus batrachopus</i>	Rank 1B.3	Closed-cone coniferous forest, chaparral; located on serpentine talus slopes. Elevation range: 990 – 2,115 feet. Blooms: April – July.	No Potential. The Study Area does not contain suitable habitat to support this species, such as coniferous forest, or chaparral.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Tiburon jewel-flower <i>Streptanthus glandulosus</i> <i>ssp. niger</i>	FE, SE, Rank 1B.1	Valley and foothill grassland; located on shallow rocky substrates derived from serpentine. Elevation range: 100 – 490 feet. Blooms: May – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland does not occur on shallow rock derived from serpentine, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Mount Tamalpais bristly jewel-flower <i>Streptanthus glandulosus</i> <i>ssp. pulchellus</i>	Rank 1B.2	Chaparral, valley and foothill grassland; located on serpentine slopes. Elevation range: 490 – 2,600 feet. Blooms: May – August.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland does not occur on serpentine substrate, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Suisun Marsh aster <i>Symphotrichum lentum</i>	Rank 1B.2	Freshwater and brackish marshes and swamps; typically located on slough margins and edges, closely associated with cattail, tules, bulrushes, California rose, and Delta Tule pea. Elevation range: 0 – 10 feet. Blooms: May – November.	Unlikely. The Study Area contains coastal salt marsh along sloughs of Corte Madre Bay, which do not contain the associated species. The nearest known occurrences are from the opposite side of the Bay.	No further surveys are recommended.
Two-fork clover <i>Trifolium amoenum</i>	FE, Rank 1B.1	Valley and foothill grassland, coastal bluff scrub, swales, open sunny sites, sometimes on serpentine. Elevation range: 15 – 1,365 feet. Blooms: April – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland does not occur on serpentine substrate, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Saline clover <i>Trifolium hydrophilum</i>	Rank 1B.2	Marshes and swamps, mesic portions of alkali vernal pools, mesic, alkali valley and foothill grassland. Elevation range: 0 – 985 feet. Blooms: April – June.	Unlikely. While the Study Area contains brackish and coastal salt marsh habitat that may provide suitable habitat to this species, this species was last observed in 1900, over 7 miles east of the Study Area, with an unknown exact location in Point Richmond.	No further surveys are recommended. .

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
San Francisco owl's-clover <i>Triphysaria floribunda</i>	Rank 1B.2	Coastal prairie, valley and foothill grassland; located on serpentine and non-serpentine substrate. Elevation range: 30 – 520 feet. Blooms: April – June.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland does not occur on serpentine substrate, is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.
Coastal triquetrella <i>Triquetrella californica</i>	Rank 1B.2	Coastal bluff scrub, coastal scrub, valley and foothill grassland; grows within 100 feet of the coastline in scrub and grasslands on open gravel substrates of roads, hillsides, bluffs, and slopes. Elevation range: 30 – 325 feet.	Unlikely. The Study Area may contain marginally suitable habitat elements for this species, such as grassland habitat; however, the non-native grassland is of degraded quality with a high density of invasive species, and has high levels of disturbance that limit the potential for occurrence.	No further surveys are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Mammals				
Pallid bat <i>Antrozous pallidus</i>	SSC, WBWG High	Found in deserts, grasslands, shrublands, woodlands, and forests. Roost sites include old ranch buildings, rocky outcrops and caves within sandstone outcroppings. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	Unlikely. Although this species is widely distributed in California and is found in a variety of habitats, there is no suitable roosting habitat for the species. This species may forage over the Study Area.	No further actions are recommended.
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	SSC, WBWG High	This species is associated with a wide variety of habitats from deserts to mid-elevation mixed coniferous-deciduous forest. Females form maternity colonies in buildings, caves and mines and males roost singly or in small groups. Foraging occurs in open forest habitats where they glean moths from vegetation.	Unlikely. The Study Area does not contain typical foraging habitat and there is no suitable roosting habitat for this species.	No further actions are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
<p>Hoary bat <i>Lasiurus cinereus</i></p>	<p>WBWG Medium</p>	<p>Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires standing water to drink.</p>	<p>Unlikely. The Study Area lacks trees with dense foliage. Additionally, the Study Area does not have available freshwater, which is required by the species due to its relatively poor urine concentrating abilities.</p>	<p>No further actions are recommended.</p>
<p>Western red bat <i>Lasiurus blossevillii</i></p>	<p>SSC, WBWG High</p>	<p>Highly migratory and broadly distributed. They are typically solitary, roosting primarily in the foliage of trees or shrubs. Day roosts are commonly in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas and association with riparian habitat.</p>	<p>Unlikely. The Study Area does not provide suitable roosting habitat. Individuals may occasionally forage in the area.</p>	<p>No further actions are recommended.</p>

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
<p>Salt-marsh harvest mouse</p> <p><i>Reithrodontomys raviventris</i></p>	<p>FE, SE, CFP</p>	<p>Found only in the saline emergent wetlands of San Francisco Bay and its tributaries. Pickleweed is primary habitat. Do not burrow, build loosely organized nests. Require higher areas for flood escape.</p>	<p>High Potential. The tidal pickleweed habitat along the outboard side of the levee on the northern, eastern, and southern borders and adjacent upland habitats are suitable for this species which is known to occur in adjacent Marta's Marsh. The non-tidal pickleweed habitat within the levee in the southern Study Area also provides suitable habitat.</p>	<p>Management considerations are provided in Section 4.5.</p>
<p>San Pablo vole</p> <p><i>Microtus californicus sanpabloensis</i></p>	<p>SSC</p>	<p>Saltmarshes of San Pablo Creek, on the south shore of San Pablo Bay. Constructs burrow in soft soil. Feeds on grasses, sedges and herbs. Forms a network of runways leading from the burrow.</p>	<p>No Potential. The Study Area is out of the known range for this species.</p>	<p>No further actions are recommended.</p>
<p>Suisun shrew</p> <p><i>Sorex ornatus sinuosus</i></p>	<p>SSC</p>	<p>Tidal marshes of the northern shores of San Pablo and Suisun Bays. Require dense low-lying cover and driftweed and other litter above the mean hightide line for nesting and foraging.</p>	<p>No Potential. The Study Area is out of the known range for this species.</p>	<p>No further actions are recommended.</p>

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Salt-marsh wandering shrew <i>Sorex vagrans halicoetes</i>	SSC	Salt marshes of the south arm of San Francisco Bay. Medium high marsh 6 to 8 feet above sea level where abundant driftwood is scattered among <i>Salicornia</i> .	No Potential. The Study Area is out of the known range for this species.	No further actions are recommended.
Point Reyes jumping mouse <i>Zapus trinotatus orarius</i>	SSC	Bunch grass marshes on the uplands of Point Reyes in areas safe from continuous inundation. Eats mainly grass seeds with some insects and fruit taken. Builds grassy nests on ground under vegetation, burrows in winter.	No Potential. The Study Area is out of the known range for this species.	No further actions are recommended.
Southern sea otter <i>Enhydra lutris nereis</i>	FT, CFP	Nearshore marine environments from about Año Nuevo, San Mateo County. To Point Sal, Santa Barbara County. Needs canopies of giant kelp and bull kelp for rafting and feeding. Prefers rocky substrates with abundant invertebrates.	No Potential. The Study Area is out of the known range for this species.	No further actions are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
American badger <i>Taxidea taxus</i>	SSC	American Badgers are most abundant in dry, open-stage shrub, forest, and herbaceous habitats with friable soils. This species needs sufficient food, friable soils and open, uncultivated ground. They primarily prey on burrowing rodents.	No Potential. The Study Area does not contain suitable habitat for this species.	No further actions are recommended.
Birds				
American white pelican <i>Pelecanus erythrorhynchos</i>	SSC	(Nesting colony) Nests colonially on large interior lakes or rivers. Winters on sheltered, usually inland waters with abundant small fishes for forage.	Unlikely. Although this species was observed in adjacent lagoon habitat west of the Study Area, the Study Area contains only shallow seasonal wetlands and it does not breed in the region (Shuford and Gardali 2008).	No further actions are recommended.
Northern harrier <i>Circus cyaneus</i>	SSC	Resident and winter visitor in southern California. Nests and forages in grassland habitats, usually in association with coastal salt and freshwater marshes. Nests on ground in shrubby vegetation, usually at marsh edge; nest built of a large mound of sticks in wet areas.	Moderate Potential. The Study Area provides suitable grassland foraging habitat for the species. Suitable nesting habitat is also present; however, high human disturbance may preclude nesting.	Work windows or pre-construction nesting bird surveys. Management considerations are provided in Section 4.5.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
White-tailed kite <i>Elanus leucurus</i>	CFP	Resident of coastal and valley lowlands; often associated with agricultural areas. Preys on small diurnal mammals as well as other vertebrates and insects. Nests in small to large trees, often at habitat edges.	Moderate Potential. The Study Area provides suitable foraging and nesting habitat for the species, although none were observed during the July 15, 2014 site visit.	Work windows or pre-construction nesting bird surveys. Management considerations are provided in Section 4.5.
American peregrine falcon <i>Falco peregrinus anatum</i>	FD, SD, CFP, BCC	Resident and winter visitor. Occurs in a wide variety of habitats, though often associated with coasts, bays, marshes and other bodies of water. Nests on protected cliffs and also on manmade structures including buildings and bridges. Preys on birds, especially waterbirds. Forages widely.	Unlikely. The Study Area does not contain nesting habitat; however, this species may be observed foraging over the Study Area.	No further actions are recommended.
Short-eared owl <i>Asio flammeus</i>	SSC	(Nesting) found in swamp lands, both fresh and salt; lowland meadows; irrigated alfalfa fields. Tule patches/tall grass needed for nesting/daytime seclusion. Nests on dry ground in depression concealed in vegetation.	Unlikely. Areas with potential for nesting receive high human disturbance. This species may nest in adjacent marshlands and could forage within the Study Area.	No further actions are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Burrowing owl <i>Athene cunicularia</i>	SSC, BCC	Resident and winter visitor in open, dry annual or perennial grasslands and scrub habitats with low-growing vegetation, perches and abundant mammal burrows. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	Unlikely. No suitable burrow habitat was observed within or adjacent to the Study Area, and ground squirrels were not observed.	No further actions are recommended.
Western snowy plover <i>Charadrius alexandrinus nivosus</i>	FT, SSC, BCC	(Nesting) Federal listing applies only to the Pacific coastal population. Found on sandy beaches, salt pond levees and shores of large alkali lakes. Requires sandy, gravelly or friable soils for nesting.	Unlikely. Beach habitat is not present within the Study Area. Friable soils are not exposed until wetland areas dry in late spring to early summer.	No further actions are recommended.
California clapper rail <i>Rallus longirostris obsoletus</i>	FE, SE, CFP	Resident in tidal marshes of the San Francisco Bay Estuary. Requires tidal sloughs and mud flats for foraging, and dense vegetation for nesting. Associated with abundant growth of cordgrass and pickleweed.	Present. This species was observed foraging in the mudflat and pickleweed habitat in the northwest Study Area. Nesting within the Study Area is unlikely; however, this species has been documented nesting in the adjacent marsh.	Work windows or protocol-level nesting surveys to determine nest proximity to Project activities. Nesting buffers extend up to 200 meters. Management considerations are provided in Section 4.5.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
California black rail <i>Laterallus jamaicensis coterniculus</i>	ST, CFP, BCC	Resident in marshes (saline to freshwater) with dense vegetation below four inches in height. Prefers larger, undisturbed marshes close to a major water source.	Moderate Potential. No suitable nesting habitat for this species is present within the Study Area, this species has been documented nesting in the adjacent marsh habitat. It may forage in the extreme northwest Study Area.	Work windows or protocol-level nesting surveys to determine nest proximity to Project activities. Nesting buffers extend up to 200 meters. Management considerations are provided in Section 4.5.
Nuttall's woodpecker <i>Picoides nuttallii</i>	BCC	Resident in lowland woodlands throughout much of California west of the Sierra Nevada. Typical habitat is dominated by oaks.	Unlikely. Nesting habitat suitable for this species is not present within the Study Area. No cavities were observed and trees atypical of suitable nest trees.	No further actions are recommended.
Oak titmouse <i>Baeolophus inornatus</i>	BCC	Resident in woodland and savannah habitats where oaks are present, as well as riparian areas. Nests in tree cavities.	Unlikely. Nesting habitat suitable for this species is not present within the Study Area. No cavities were observed and trees atypical of suitable nest trees.	No further actions are recommended.
Olive-sided flycatcher <i>Contopus cooperi</i>	SSC, BCC	Nesting habitats are mixed conifer, montane hardwood-conifer, douglas-fir, redwood, red fir and lodgepole pine.	Unlikely. Suitable habitat for this species is not present within or adjacent to the Study Area.	No further actions are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
San Francisco (salt-marsh) common yellowthroat <i>Geothlypis trichas sinuosa</i>	SSC, BCC	Resident of the San Francisco Bay region, in fresh and salt water marshes. Requires thick, continuous cover down to water surface for foraging; tall grasses, tule patches, willows for nesting.	Moderate Potential. This species may nest along the levees within the Study Area which are adjacent to pickleweed and salt marsh habitat.	Work windows or pre-construction nesting bird surveys. Management considerations are provided in Section 4.5.
Yellow warbler <i>Setophaga (Dendroica) petechia brewsteri</i>	SSC, BCC	Frequents riparian plant associations. Prefers willows, cottonwoods, aspens, sycamores and alders for nesting and foraging.	Unlikely. The Study Area does not contain suitable riparian or dense understory habitat for breeding. This species may be observed during migration.	No further actions are recommended.
San Pablo song sparrow <i>Melospiza melodia samuelis</i>	SSC, BCC	Resident of salt marshes along the north side of San Francisco and San Pablo Bays. Inhabits tidal sloughs in <i>Salicornia</i> marshes; nests in <i>Grindelia</i> bordering slough channels.	Present. This species may nest near the levees within the Study Area which are adjacent to pickleweed and salt marsh habitat.	Work windows or pre-construction nesting bird surveys. Management considerations are provided in Section 4.5.
Tricolored blackbird <i>Agelaius tricolor</i>	SSC, BCC	A highly colonial resident species, most numerous in the Central Valley and vicinity. Usually nests over or near freshwater in dense emergent growth, riparian thickets, or flooded agricultural fields.	Unlikely. Suitable nesting and freshwater habitat is not present within or adjacent to the Study Area.	No further actions are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Reptiles and Amphibians				
Foothill yellow-legged frog <i>Rana boylei</i>	SSC	Inhabits shallow, small to medium sized, rocky streams, from sea level to about 6,365 feet.	No Potential. The Study Area does not contain freshwater or stream habitat for this species.	No further actions are recommended.
California red-legged frog <i>Rana draytonii</i>	FT, SSC	Inhabits permanent and semi-permanent aquatic habitats with emergent, submergent and/or riparian vegetation, including ponds and creek backwaters. In non-perennial aquatic habitats, may aestivate in rodent burrows or cracks during dry periods.	No Potential. The Study Area does not contain freshwater habitat and is not within dispersal distance of occupied habitat. The Study Area is filled former Bayland and contains salt-tolerant vegetation species.	No further actions are recommended.
Pacific pond turtle <i>Actinemys marmorata</i>	SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches with aquatic vegetation. Requires basking sites such as partially submerged logs, vegetation mats, or open mud banks, and suitable upland habitat (sandy banks or grassy open fields) for egg-laying.	No Potential. The Study Area does not contain freshwater habitat and is not within dispersal distance of occupied habitat.	No further actions are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Fishes				
Coho salmon- central California coast DPS <i>Oncorhynchus kisutch</i>	FE, SE, NMFS	Federal listing includes populations between Punta Gorda and San Lorenzo River. State listing includes populations south of San Francisco Bay only. Occurs inland and in coastal marine waters. Requires beds of loose, silt-free, coarse gravel for spawning.	No Potential. This species is considered extinct from San Francisco Bay.	No further actions are recommended.
Longfin smelt <i>Sprinichus thaleichthys</i>	FC, ST, SSC	Euryhaline, nektonic and anadromous. Found in open waters of estuaries, mostly in middle or bottom of water column. Prefer salinities of 15 to 30 ppt, but can be found in completely freshwater to almost pure seawater.	Unlikely. The slough in the northwest portion of the Study Area is not deep enough to be used by this species and often does not contain water during low tide. This is the only portion of the Study Area contiguous with the San Francisco Bay. This species does not spawn in western San Francisco Bay.	No further actions are recommended.
Sacramento splittail <i>Pogonichthys macrolepidotus</i>	SSC	Endemic to the lakes and rivers of the Central Valley, but now confined to the Sacramento Delta, Suisun Bay and associated marshes. Occurs in slow-moving river sections and sloughs.	No Potential. The Study Area is out of this species known range.	No further actions are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Tidewater goby <i>Eucyclogobius newberryi</i>	FE, SSC	Brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found in shallow lagoons and lower stream reaches.	No Potential. This species is considered extirpated from within San Francisco Bay.	No further actions are recommended.
Invertebrates				
Monarch butterfly <i>Danaus plexippus</i>	SSI	Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, Monterey cypress), with nectar and water sources nearby.	Unlikely. The Study Area does not contain trees suitable for winter roost sites; however, this species fly through the area during migration.	No further actions are recommended.
San Bruno elfin butterfly <i>Callophrys mossii bayensis</i>	FE, SSI	Limited to the vicinity of San Bruno Mountain, San Mateo County. Colonies are located on in rocky outcrops and cliffs in coastal scrub habitat on steep, north-facing slopes within the fog belt.	No Potential. The Study Area is out of the species current range and habitat suitable for this species is not present.	No further actions are recommended.

SPECIES	STATUS	HABITAT REQUIREMENTS	POTENTIAL FOR OCCURRENCE	RECOMMENDATION
Mission blue butterfly <i>Plebejus icaroides missionensis</i>	FE, SSI	Inhabits grasslands of the San Francisco peninsula. Three larval host plants: <i>Lupinus albifrons</i> , <i>L. variicolor</i> , and <i>L. formosus</i> , of which <i>L. albifrons</i> is favored.	No Potential. Habitat suitable for this species does not exist within or adjacent to the Study Area.	No further actions are recommended.
Callippe silverspot butterfly <i>Speyeria callippe callippe</i>	FE, SSI	Restricted to the northern coastal scrub of the San Francisco peninsula. Hostplant is <i>Viola pedunculata</i> . Most adults found on east-facing slopes; males congregate on hilltops in search of females.	No Potential. No scrub and suitable habitat for this species is found within or adjacent to the Study Area.	No further actions are recommended.
Marin blind harvestman <i>Calicina diminua</i>	SSI	Known only from the type locality: taken under serpentine on a grassland hillside in Novato, Marin County.	No Potential. No serpentine or suitable habitat for this species is found within or adjacent to the Study Area.	No further actions are recommended.

*** Key to status codes:**

BCC	USFWS Bird of Conservation Concern
CFP	CDFW Fully Protected Animal
EPA	Bald and Golden Eagle Protection Act
FC	Federal Candidate
FD	Federal Delisted
FE	Federal Endangered
FT	Federal Threatened
List 1B	CNPS California Rare Plant Rank 1B: Rare, threatened or endangered in California and elsewhere
List 2	CNPS California Rare Plant Rank 2: Rare, threatened, or endangered in California, but more common elsewhere
List 3	CNPS California Rare Plant Rank 3: Potentially rare species for which CNPS needs more information (a review list)

List 4	CNPS California Rare Plant Rank 4: Plants of limited distribution (watch list)
NMFS	Species under jurisdiction of NMFS
SASEA	San Andreas Significant Ecological Area species
SD	Stated Delisted
SE	State Endangered
ST	State Threatened
SSI	State Special-Status Invertebrate
WBWG	Western Bat Working Group High or Medium Priority species
WL	CDFW Watch List

APPENDIX C

PRELIMINARY IDENTIFICATION OF WETLANDS AND NON-WETLAND WATERS IN THE
STUDY AREA

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Acreage of Wetlands Within Study Area				
Feature	Feature Type	Area (acres)	Length (linear feet)	NWI Code
A	Tidal channel	2.11	2,250	E2US3N
B	Coastal salt marsh	3.70	n/a	E2EM1P
C	Tidal channel	0.27	1,655	E2US3N
D	Coastal salt marsh	18.16	n/a	E2EM1P
E	Tidal channel	0.59	3,215	E2US3N
F	Seasonal wetland	0.06	n/a	PEM1C/2E
G	Seasonal wetland	0.03	n/a	PEM1C/2E
H	Seasonal wetland	0.03	n/a	PEM1C/2E
I	Seasonal wetland	0.04	n/a	PEM1C/2E
J	Seasonal wetland	0.11	n/a	PEM1C/2E
K	Seasonal wetland	1.23	n/a	PEM1C/2E
L	Seasonal wetland	0.50	n/a	PEM1C/2E
M	Seasonal wetland	18.10	n/a	PEM1C/2E
N	Seasonal wetland	0.01	n/a	PEM1C/2E
O	Seasonal wetland	0.14	n/a	PEM1C/2E
P	Seasonal wetland	0.30	n/a	PEM1C/2E
Q	Seasonal wetland	0.01	n/a	PEM1C/2E
R	Coastal salt marsh	0.02	n/a	E2EM1P
S	Coastal salt marsh	0.06	n/a	E2EM1P

Acreage of Wetlands Within Parcel Boundary Only				
Feature	Feature Type	Area (acres)	Length (linear feet)	NWI Code
A	Tidal channel	1.94	2,020	E2US3N
B	Coastal salt marsh	2.84	n/a	E2EM1P
D	Coastal salt marsh	1.15	n/a	E2EM1P
F	Seasonal wetland	0.06	n/a	PEM1C/2E
G	Seasonal wetland	0.03	n/a	PEM1C/2E
H	Seasonal wetland	0.03	n/a	PEM1C/2E
I	Seasonal wetland	0.04	n/a	PEM1C/2E
J	Seasonal wetland	0.11	n/a	PEM1C/2E
K	Seasonal wetland	1.23	n/a	PEM1C/2E
L	Seasonal wetland	0.50	n/a	PEM1C/2E
M	Seasonal wetland	18.08	n/a	PEM1C/2E
N	Seasonal wetland	0.01	n/a	PEM1C/2E
O	Seasonal wetland	0.14	n/a	PEM1C/2E
Q	Seasonal wetland	0.01	n/a	PEM1C/2E
R	Coastal salt marsh	0.02	n/a	E2EM1P
S	Coastal salt marsh	0.06	n/a	E2EM1P

- Sample Points
- - - Hide Tide Line: 7.71 feet (NAVD88)
- - - Mean High Water: 5.35 feet (NAVD88)
- ▭ Parcel Boundary
- ▭ Study Area (96.29 acres)

**Potential Waters of the United States
(acres within Study Area/Parcel Boundary)**

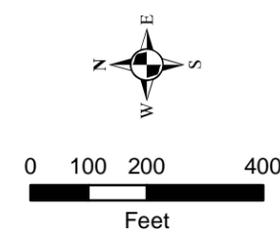
Section 404

- ▭ Seasonal Wetland (20.55 acres/20.24 acres)
- ▭ Coastal Salt Marsh (20.17 acres/3.52 acres)
- ▭ Tidal Channel (0.09 acre)

Section 10/404

- ▭ Coastal Salt Marsh (1.78 acres/0.55 acre)
- ▭ Tidal Channel (2.88 acres/1.94 acres)

Appendix C –
Preliminary
Identification of
Wetlands and
Non-Wetland Waters
in the Study Area



Map Prepared Date: 6/16/2015
Map Prepared By: pkobylarz
Base Source: Marin County 4/20/2011
Data Source(s): WRA

APPENDIX D

REPRESENTATIVE PHOTOGRAPHS OF THE STUDY AREA

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Top (D.1) View facing east from the northwest corner of Study Area of tidal channels.

Bottom (D.2): View facing east from the northwest corner of Study Area of tidal channels near peak high tide of 5.7 feet.

Photographs taken July 15, 2014.





Top (D.3): Non-native grassland habitat in northern portion of Study Area looking south.

Bottom (D.4): Curly dock seasonal wetland habitat in the northern portion of the Study Area.

Photographs taken July 15, 2014.





Top (D.5): Pampas grass habitat in northeast portion of the Study Area.

Bottom (D.6): Pampas grass and brass buttons seasonal wetland habitat in northern portion of the Study Area.

Photographs taken July 15, 2014.





Top (D.7): Fields of fat hen and brassbuttons seasonal wetlands in the central-east portion of the Study Area.

Bottom (D.8): View facing north of pickleweed mats in the southern part of the Study Area, inboard of levees.

Photographs taken July 15, 2014.





Top (D.9): Acacia woodland habitat with adjacent pampas grass patches, located in the central-west portion of the Study Area.

Bottom (D.10): View of cordgrass within tidal channel habitat in the northern part of the Study Area.

Photographs taken July 15, 2014.





Top (D.11): View facing north of salt marsh bulrush marsh patch along southern portion of Study Area, inboard of western levee.

Bottom (D.12): View facing east of non-native grassland habitat present along the inboard bank of eastern levee in the Study Area.

Photographs taken July 29, 2014.





Top (D.13): View of fennel patches that is split by developed/disturbed area of formal trail along eastern levee of Study Area.

Bottom (D.14): View facing east of salt grass flats and pickleweed mats in coastal salt marsh located along eastern portion of Study Area.

Photographs taken July 15 (Top) and (Bottom) July 29, 2014.





Top (D.15): View facing west of coyote brush scrub in north central portion of Study Area.

Bottom (D.16): View facing east of French broom patch, located in northwestern portion of Study Area.

Photographs taken July 15 (Top) and (Bottom) August 14, 2014.





Top (D.17): View facing south of western levee with developed/disturbed area associated with formal trail.

Bottom (D.18): View facing east of levee with formal trail located along southern portion of Study Area.

Photographs taken July 15, 2014.

