Palo Alto Baylands

Existing Conditions

Prepared for:

City of Palo Alto

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CITY OF PALO ALTO

Palo Alto Baylands

Existing Conditions

Prepared for:

City of Palo Alto
Community Services Department
Kristen O'Kane, Project Manager, Assistant Director

and

Open Space, Parks and Golf Administration
Daren Anderson, Division Manager

Prepared by:

AECOM
2020 L Street, Suite 400
Sacramento, CA 95811

Contact:

Diana Edwards, Deputy Project Manager
Petra Unger, Project Manager

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Acronyms and Other Abbreviations

Bay	San Francisco Bay
Baylands	Palo Alto Baylands Nature Preserve
City	City of Palo Alto
CNDDB	California Natural Diversity Database.
Flood Control Basin	Palo Alto Flood Control Basin
OEI	Olofson Environmental, Inc.
RWQCP	Regional Water Quality Control Plant
SEFI	San Francisco Estuary Institute
USFWS	U.S. Fish and Wildlife Service

Existing Conditions

1. Overview

The 1,940-acre Palo Alto Baylands Nature Preserve (Baylands) is a jewel within the wetlands of South San Francisco Bay (Bay). The Baylands provide a wide variety of recreational and educational benefits to the public and support the Bay's important ecosystem functions. The Baylands' myriad of natural wetlands, marshes, and uplands are ecologically important, as they provide important habitat for imperiled species such as the salt marsh harvest mouse (*Reithrodontomys raviventris*), Ridgway's rail (*Rallus obsoletus*), and western burrowing owl (*Athene cunicularia*).

The *Palo Alto Parks, Trails, Natural Open Space, & Recreation Master Plan* (City of Palo Alto 2017) contains policies for the protection of natural habitat, natural ecosystems, and ecological principles throughout Palo Alto. The master plan calls for the development of a comprehensive conservation plan for the Baylands to "…identify strategies to balance ecosystem preservation, passive recreation, and environmental education. The protection of biological resources from visitor use impacts shall be the priority in these open space preserves" (City of Palo Alto 2017).

The Baylands provide unique nature and recreational experiences for the Bay Area community. Facilities and intersecting trails throughout the Baylands allow for wildlife viewing, hiking, bike riding, water sports, and use of public lands for art installations. The Baylands also include facilities for other recreation opportunities such as the Palo Alto Municipal Golf Course and the Baylands Athletic Center. Nonrecreational facilities within the Baylands include the Palo Alto Airport, the Baylands Ranger Station, and the Regional Water Quality Control Plant (RWQCP).

City of Palo Alto (City) Baylands rangers have partnered with Save the Bay, a nonprofit that aims to protect and restore San Francisco Bay, with the goal of restoring and enhancing the Baylands' habitats. The Baylands are home to Save the Bay's plant nursery, which provides approximately 20,000 plants for restoration projects around the Bay's shoreline. The Baylands also provide a backdrop for education programs that promote environmental stewardship and volunteerism. The City and its partners work together to manage the Baylands holistically for ecosystem function, safety, and public access.

2. Physical and Biological Setting

2.1. Vegetation Types

The Baylands, located along the South Bay shoreline (Figures 1 and 2), historically supported a mosaic of diverse vegetation types. Today, approximately 36 percent of the Baylands is composed of tidal marsh and other wetland habitats (SFEI 2016). Tidal marsh vegetation can be subdivided into tidal salt marsh and tidal brackish marsh, depending on the salinity of the water supporting the wetland. These vegetation types have different dominant plant species.

Five vegetation types are common throughout the Baylands: tidal salt marsh, tidal brackish marsh, diked or muted wetlands, nonnative annual grassland, and riparian forest. Figure 3 shows the locations of these vegetation types within the Baylands.

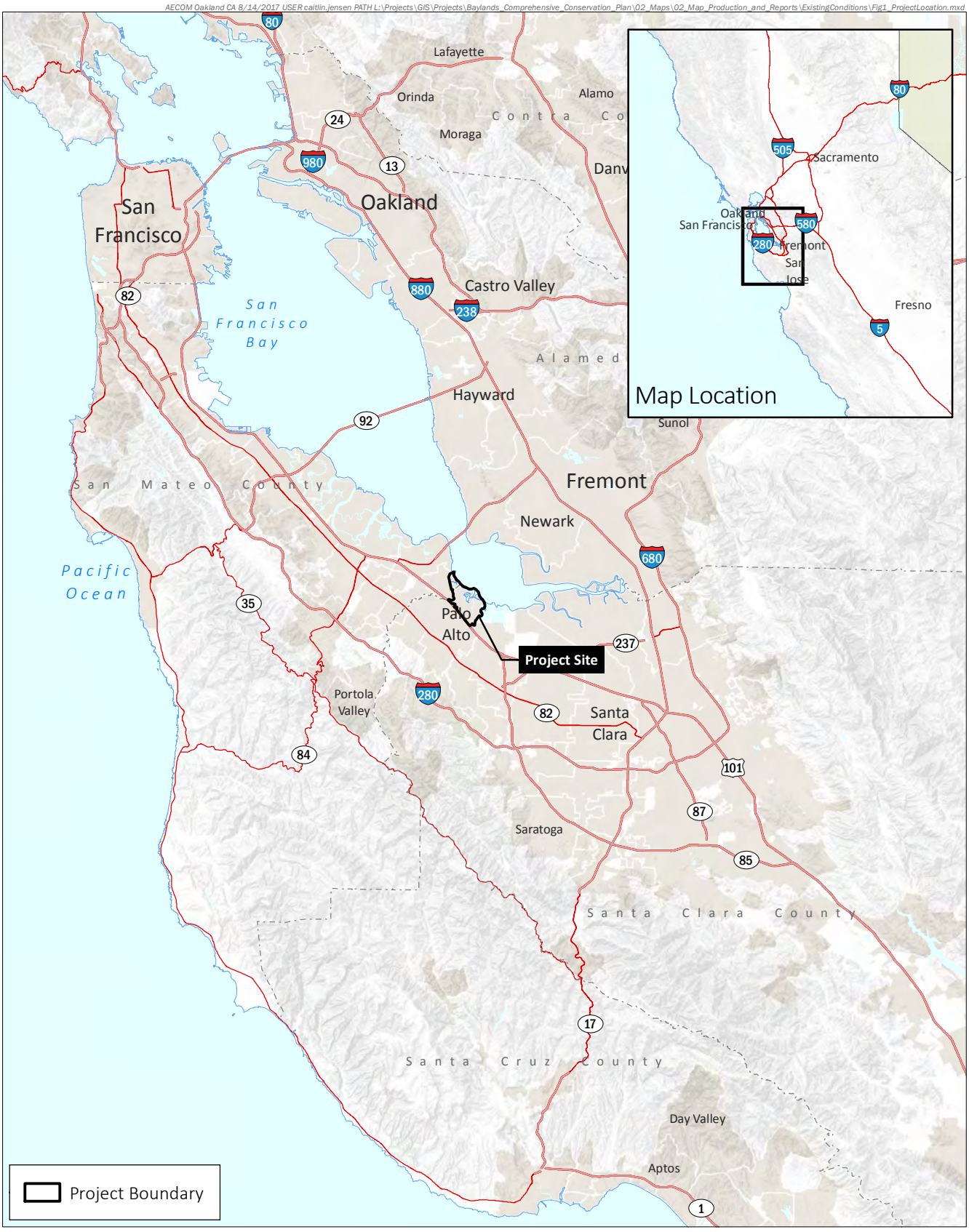
Tidal marsh in the Baylands is subject to tidal action and dominated by Pacific cordgrass (*Spartina foliosa*) and pickleweed (*Salicornia* spp.). Other common species present include dodder (*Cuscuta salina*), gumplant (*Grindelia stricta*), alkali-heath (*Frankenia salina*), and invasive species including pepper grass (*Lepidium latifolium*). Tidal brackish marsh occurs in areas of the Baylands where freshwater locally reduces salinity. This vegetation community is characterized by the dominance of bulrush (*Bolboschoenus* spp.).

Areas, where trails and levees intersect the Baylands, are dominated by grassland comprising nonnative annual grasses and invasive forbs including fennel (*Foeniculum vulgare*), wild mustard (*Brassica* spp.), nonnative shrub and tree species, and various nonnative annual grasses and thistles (*Cirsium* spp., *Carduus* spp.).

Diked salt marsh, or muted wetland, is an area of historic tidal marsh that has been cut off from tidal influence by dikes or levees, but that maintains wetland features (Goals Project 2015). Vegetation communities in diked salt marsh are similar to those in tidal marshes; typically, however, fewer native plant species are present, and nonnative plant species are a large component (Goals Project 2015). Areas of the Baylands characterized by diked salt marsh are dominated by nonnative plant species including common reed (*Phragmites australis*), arundo (*Arundo donax*), and tall wheatgrass (*Thinopyrum ponticum*), with other common plant species present including pickleweed, bulrush species, and cattails (*Typha* spp.).

The Baylands' nonnative grassland vegetation community is characterized by annual grassland species introduced from Europe. Areas identified as nonnative grassland are dominated by wild oats (*Avena* spp.), Italian ryegrass (*Festuca perennis*), stinkwort (*Dittrichia graveolens*), various nonnative thistle species, and fennel. Native species that are fairly common in the Baylands include coyote brush (*Baccharis pilularis*) and creeping wildrye (*Elymus triticoides*).

Riparian forest borders the edges of rivers and streams in the Baylands and is characterized by lush understory vegetation and high biodiversity (Goals Project 2015). Within the Matadero Creek and Adobe Creek corridors, riparian forest is dominated by willow (*Salix* spp.), California sycamore (*Platanus racemosa*), walnut (*Juglans* spp.), and nonnative eucalyptus (Eucalyptus spp.) and acacia (Acacia spp.). Common understory species include California blackberry (*Rubus ursinus*), elderberry (*Sambucus* spp.), wild rose (*Rosa californica*), and nonnative grasses.



AECOM

FIGURE 1

Project Location

Palo Alto Baylands Comprehensive Conservation Plan

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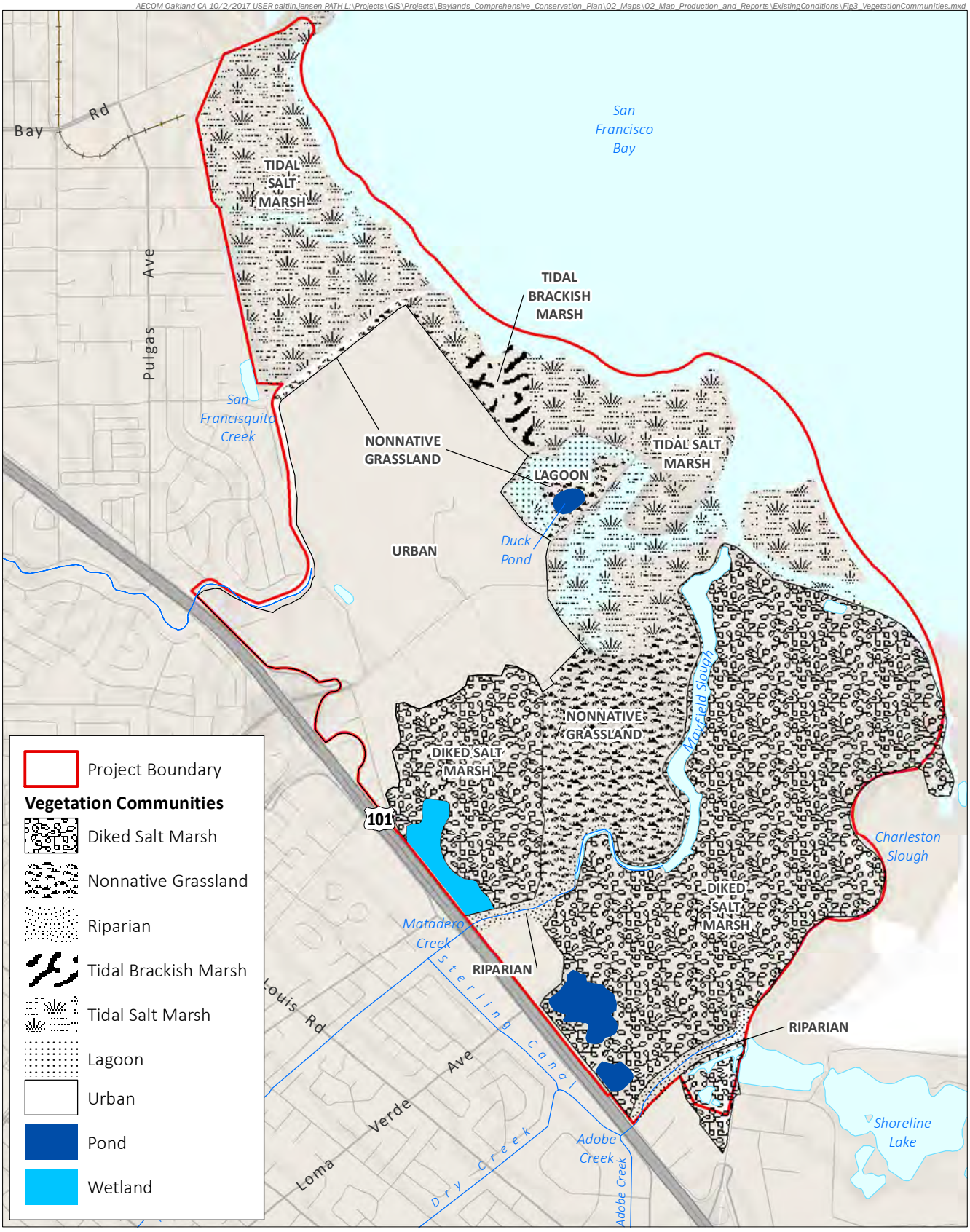
FIGURE 2

Project Vicinity

Palo Alto Baylands Comprehensive Conservation Plan



AECOM, 2017
National Hydrography Dataset, 2017
Esri, 2017

AECOM

FIGURE 3

Vegetation Communities

Palo Alto Baylands Comprehensive Conservation Plan

2.2. Habitat Areas

The Baylands support a variety of plant and wildlife species, including endemics that rely on specific habitat types for survival. The Baylands also provide seasonal habitat for migratory bird species that use the area for overwintering habitat or as an important stopping point along the Pacific Flyway (Figure 4).

2.2.1. Duck Pond and Tidal Lagoon

The Duck Pond and adjacent tidal lagoon provide foraging, nesting, and roosting habitat for various shorebirds and waterfowl throughout the year. A grove of palm trees located northwest of the Duck Pond is protected with fencing and designated as a bird sanctuary for herons and egrets, which utilized this area as a rookery during breeding season in 2005–2010 (City of Palo Alto 2008; Bicknell, pers. comm., 2017).

The tidal lagoon is connected to the bay through two culverts underneath Embarcardero Road. The lagoon is characterized by fine-grained silt and clay soils that become inundated twice daily by tidal action and support an extensive invertebrate community including diatoms, polychaete worms, mussel species, amphipods, and crustaceans (USFWS 2013a). Native horn snails (*Cerithidea californica*) occupy the mudflats within the tidal lagoon in the marsh near the Baylands Nature Center. Invasive eastern mud snail (*Ilyanassa obsolete*) now dominates many of the mudflat areas once occupied by the horn snail. These invertebrates are an important food source for waterfowl and larger shorebirds.

Foraging and nesting habitat is available for overwintering shorebirds and waterfowl that migrate seasonally along the Pacific Flyway. Approximately 50 species of shorebird and waterfowl are residents in and migrants of the Baylands. Common species observed include mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), American avocet (*Recurvirostra americana*), black-necked stilt (*Himantopus mexicanus*), lesser yellowlegs (*Tringa flavipes*), willet (*Tringa semipalmata*), long-billed curlew (*Numenius americanus*), whimbrel (*Numenius phaeopus*), snowy egret (*Egretta thula*), and sandpiper (*Calidrid* spp.).

2.2.2. Tidal Marsh

Habitat areas identified as tidal marsh include the Faber-Laumeister Tract, Harbor Point and the inner harbor channel, Harriet Mundy Marsh, Hook's Island, Sandpoint, and the unnamed slough where RWQCP treated water is discharged south of San Francisquito Creek (Figure 3). The tidal marsh areas also include tidal brackish marsh and tidal salt marsh, as described in Section 2.1, "Vegetation Types."

The majority of the Baylands is composed of channelized tidal marsh, which contains habitat features such as mudflats, pools, and dry marsh pannes. Populations of the federally listed endangered salt marsh harvest mouse and Ridgway's rail (discussed in "Special-Status Species" below) are found only in this habitat type. Other more common species include black rail (*Laterallus jamaicensis*), Virginia rail (*Rallus limicola*), and sora (*Porzana carolina*).

Areas identified as brackish salt marsh provide habitat for the saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*), a regional subspecies found in the Baylands (Figure 4). This regional subspecies is found primarily in tidal salt marshes throughout the Bay Area, with about 60 percent of yellowthroats occupying brackish marsh (Shuford 2008).

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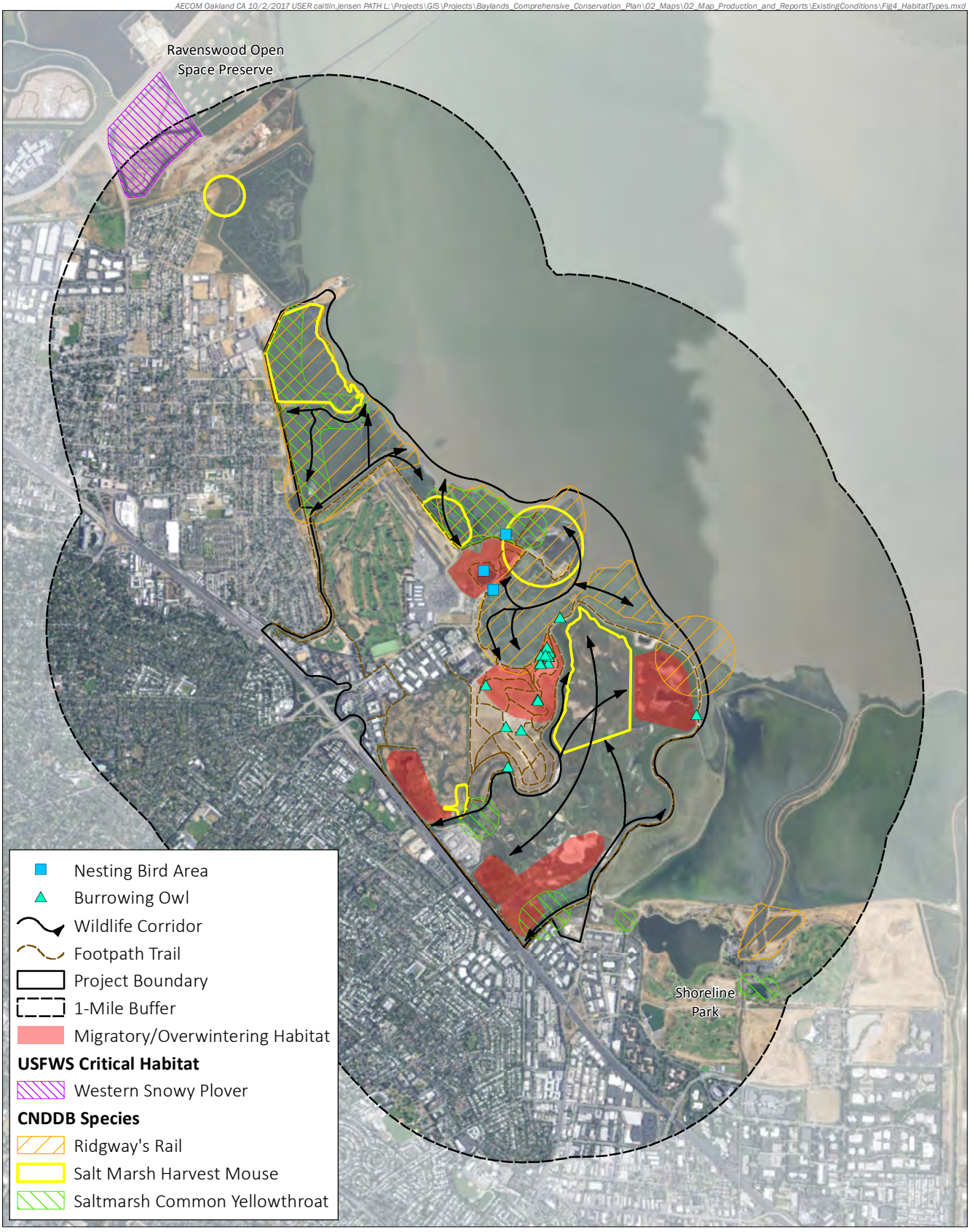


California Natural Diversity Database, August 2017
US Fish & Wildlife Service, 2017
AECOM, 2017; Esri, 2017

AECOM

FIGURE 4

Wildlife Occurrences and Movement

2.2.3. Diked Salt Marsh

Habitat defined as diked salt marsh or muted tidal marsh consists of the Palo Alto Flood Control Basin (Flood Control Basin), the Emily Renzel Wetlands, the site of the former Los Altos Treatment Plant, and the newly acquired former ITT Property (Figure 5).

Tidal action and freshwater outflows in this area are controlled by the existing tide gate system, creating conditions in which the basin receives muted tidal flows. As a result, the northern area of the Flood Control Basin closest to the tide gate experiences more saline conditions than the southern area. The southern portion of the basin is mostly dry, with marsh panne formations present throughout this area, indicating seasonal ponding. A large open area in the northeastern corner of the basin is denuded of vegetation and supports roosting by numerous seabirds throughout the day. The southern and eastern portions of the Flood Control Basin are dominated by invasive common reed and creeping wildrye, with pickleweed, alkali heath, and nonnative grasses and herbaceous species common throughout the basin.

The overall habitat composition of the Emily Renzel Wetlands and the former ITT Property is similar to that of the Flood Control Basin, with a restored freshwater pond fed by tertiary treated wastewater from the RWQCP located in the eastern section of the Emily Renzel Wetlands (Figure 5). The pond, a freshwater wetland feature dominated by cattails, likely supports species associated with this habitat type such as sora rails, herons and egrets, and passerine species, as well as amphibian and turtle species.

2.2.4. Riparian Corridors

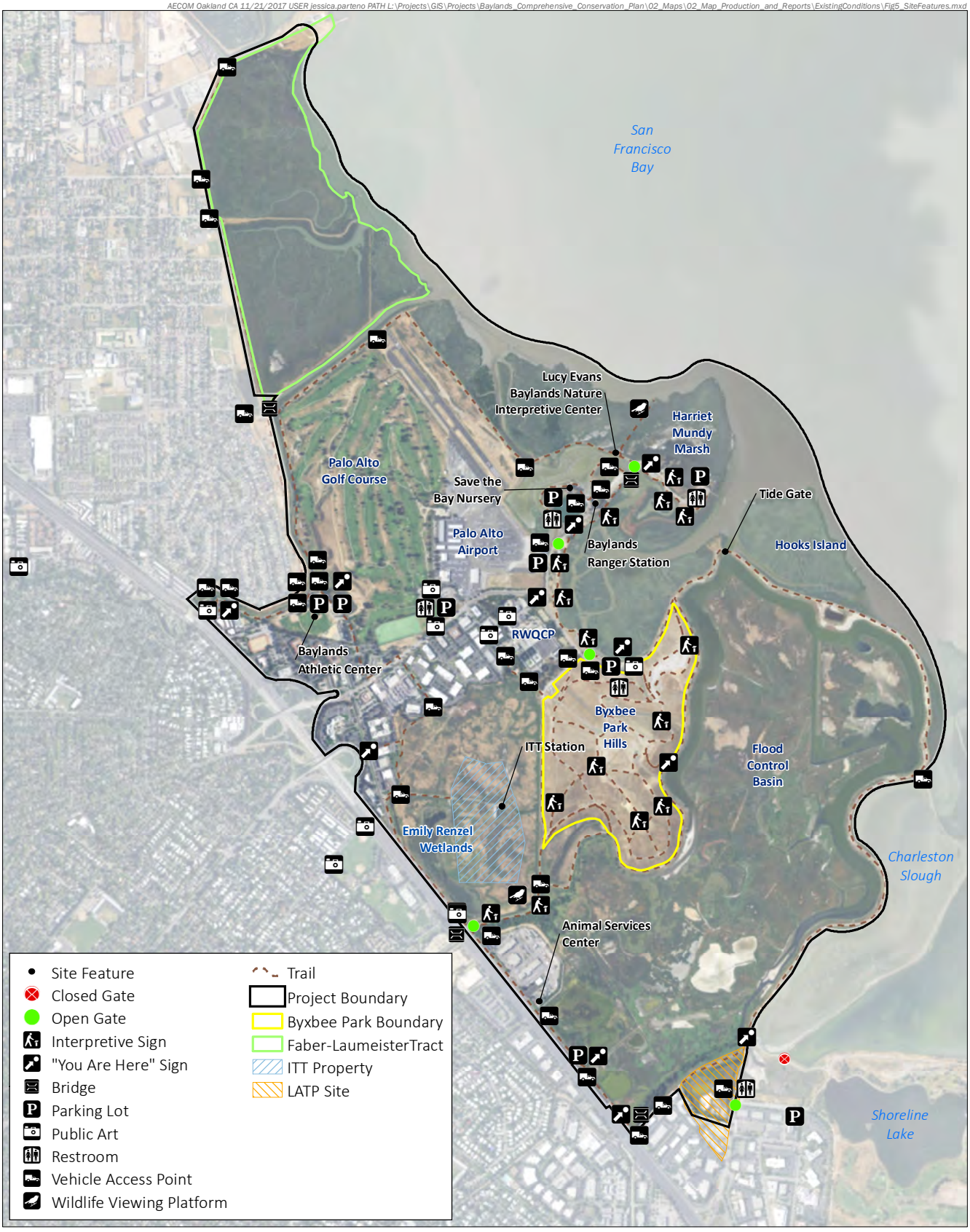
Riparian corridors are of great ecological importance for the Bay, as they feature very high biodiversity in species composition and support the greatest total number of plant and animal species (Goals Project 2015). Matadero Creek and Adobe Creek empty into the Flood Control Basin and are characterized as riparian corridor habitat (Figure 4). The upper canopy of the riparian corridor consists of a mix of native and nonnative species, including willows, sycamore, eucalyptus, and walnut; the dense, herbaceous understory matrix is composed of California blackberry, elderberry, nonnative annual grasses, and other herbaceous plants. The high diversity of plant species found in the riparian corridor provides habitat for a wide variety of wildlife species, including migratory passerine species.

2.2.5. Annual Nonnative Grassland

Before the introduction of European grazing and agriculture in California, native grasslands consisted of perennial “bunchgrass” communities. Grassland communities throughout the Bay Area have since shifted to Euro-Asian grassland species that have become naturalized to the region. The Byxbee Park Hills are characterized by annual nonnative grassland. The grassland community of Byxbee Park supports a variety of wildlife species, with known occurrences of nesting burrowing owl and black-tailed jackrabbit (*Lepus californicus*). This area also provides important hunting and foraging habitat for many raptors that rely on grassland habitat, such as white-tailed kite (*Elanus leucurus*).

2.3. Critical Habitat

No U.S. Fish and Wildlife Service (USFWS)–designated critical habitat is present in the Baylands. However, the USFWS *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* focuses on recovery of federally listed endangered and threatened species occurring in the Baylands through habitat restoration and conservation efforts (USFWS 2013a). The nearest designated critical habitat for the Western snowy plover (*Charadrius nivosus* ssp. *nivosus*), a federally listed threatened species, is adjacent to the Baylands near Ravenswood Open Space Preserve (Figure 4).



City of Palo Alto, 2014-17
Esri, 2017

AECOM

FIGURE 5
Site Features

2.4. Special-Status Species

Many of the endemic species that reside in Bay Area tidal marshes are federally listed as threatened or endangered, or are otherwise considered special-status species by the regulatory agencies, including the California Department of Fish and Wildlife. The *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* (USFWS 2013a) addresses 11 special-status plant and wildlife species; three of these species presently occur in the Baylands.

2.4.1. Ridgway's Rail

The Ridgway's rail is a marsh-dwelling bird with short rounded wings, large feet, and long toes, and secretive habits that make it difficult to detect (USFWS 2013b). This species was federally listed as endangered on October 13, 1970 (USFWS 2013b). The range of Ridgway's rail may have extended from the tidal marshes of Humboldt Bay to Morro Bay, but the species is now localized to the Bay Area, where it occurs only within the tidal and brackish salt marshes of Suisun, San Pablo, and San Francisco bays, including the South Bay. The species is currently restricted to less than 10 percent of its former geographic range, with Baywide habitat loss as the primary threat.

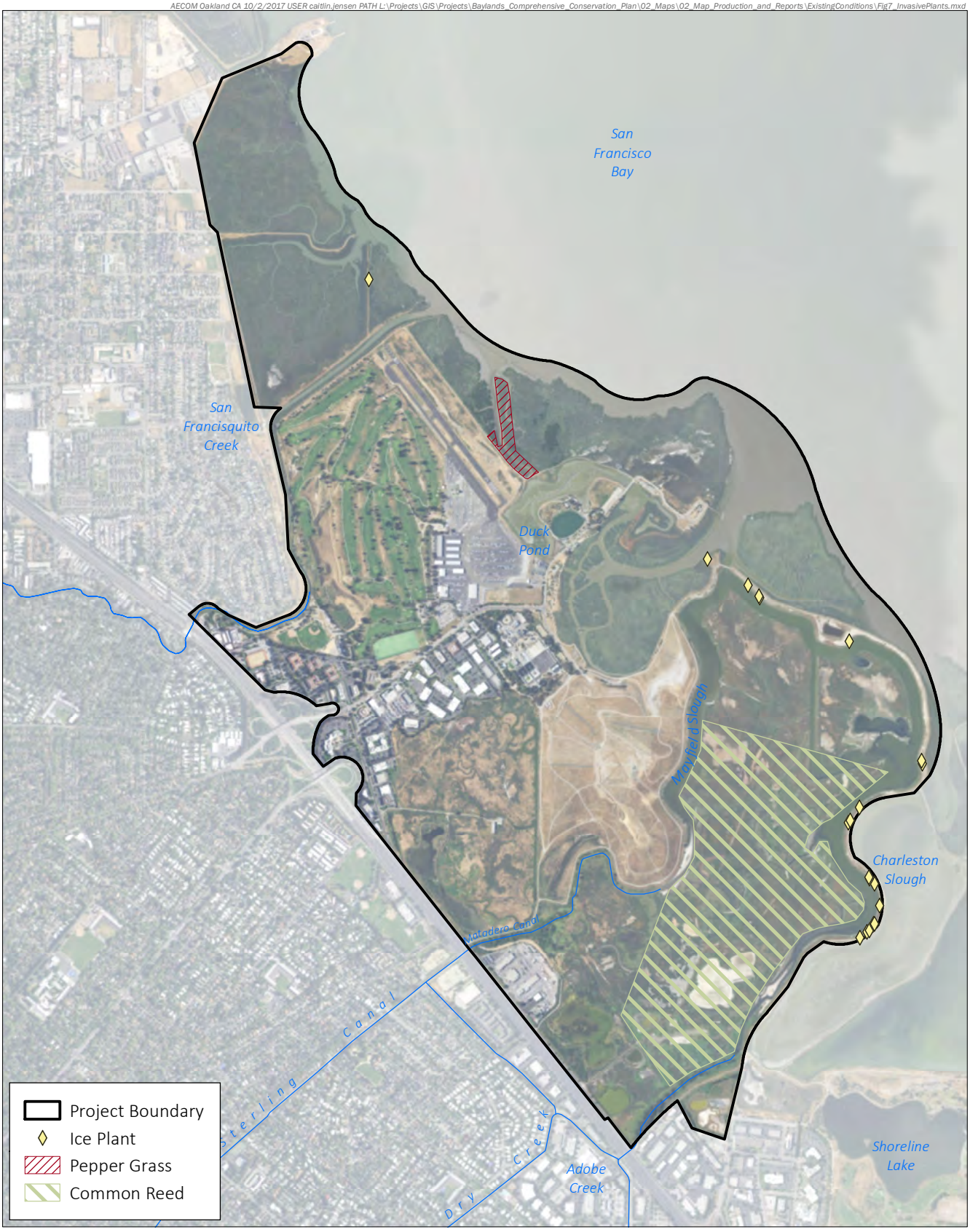
Ridgway's rails are found almost exclusively in tidal and brackish salt marsh habitats with unrestricted tidal flows, and require well-developed tidal channel networks connected to upland areas that provide escape refugia and nesting habitat (USFWS 2013b). The tidal marshes of the Baylands, including the former Palo Alto Harbor and Hooks Island, currently support a population of approximately 15–29 individuals (Point Blue 2011; OEI 2016). The Faber-Laumeister Tract supports approximately 82 individuals (Point Blue 2011; OEI 2016).

The Baylands are along the urban edge of Palo Alto, East Palo Alto, and Mountain View, where tidal marsh habitat is a patchwork of high-quality narrow fragments with limited or absent upland refugia. A reduction in upland refugia combined with anticipated sea level rise poses a future threat to this species, and current opportunities for upland migration from high-tide events are very limited, if not completely absent. Other threats include predation by terrestrial predators and encroachment by invasive *Spartina alterniflora and Lepidium* spp. on the tidal marshes of the Baylands (Figure 6).

2.4.2. Salt Marsh Harvest Mouse

The salt marsh harvest mouse is generally restricted to saline or subsaline marsh habitats around San Francisco Bay and, with some exception, brackish areas in the Suisun Bay area (USFWS 2013a). The distribution of salt marsh harvest mouse correlates with the presence of pickleweed and native cordgrass vegetation in tidal and diked salt marshes, where saline conditions are required for suitable habitat to support the species' food source and nesting habits.

Similar to Ridgway's rail, populations of salt marsh harvest mice in the Baylands appear to be limited by the distribution of high-tide cover and refugia habitat. During high-tide events, the salt marsh harvest mouse seeks refuge in upland habitat and climbs to the top of vegetation to avoid inundation. The importance of landward migration opportunities to the survival of this species indicates that anticipated sea level rise will present a severe threat in the long term, particularly in the Baylands, where opportunities for upland migration from high-tide events are very limited or absent because of the surrounding urban edge.



AECOM, 2017
Esri, 2017

AECOM

FIGURE 6

Invasive Plants

Palo Alto Baylands Comprehensive Conservation Plan

2.4.3. Salt Marsh Wandering Shrew

Salt marsh wandering shrew (*Sorex vagrans halicoetes*), a California Species of Special Concern, inhabits the salt marshes of the South Bay. This species is found in medium-height marsh, sheltering under driftwood and similar material in pickleweed habitat. Its diet consists of small invertebrates such as worms, spiders, and insects. Suitable habitat for salt marsh wandering shrew occurs in the Baylands, but this species has not been documented in the area since 1985 (CNDDB 2017).

2.4.4. Western Burrowing Owl

Western burrowing owl is a California Species of Special Concern because of declining populations related to loss of habitat. In California, burrows are most commonly dug by ground squirrels, but owls also use badger or fox dens or holes. Before 2005, eight to 10 nesting pairs of burrowing owl occupied the dry grassland areas of the former ITT Property and Byxbee Park. By 2005, nesting burrowing owls had vanished from the area, and there are currently no documented occurrences of nesting; however, several owls have been sighted in and around Byxbee Park (Anderson, pers. comm., 2017). The adjacent shoreline property in Mountain View supports one of the largest populations of burrowing owl in Santa Clara County, as implementing various management strategies has enhanced and protected burrowing owl habitat (City of Mountain View 2012).

2.5. Wildlife Corridors

The Baylands provide crucial habitat for migratory shorebirds and waterfowl traveling along the Pacific Flyway during seasonal migrations by providing foraging, resting, and nesting habitat. The large tracts of natural area present in the Baylands also provide some of the best remaining contiguous marsh and wetland habitat in the Bay Area. However, these areas have lost the majority of adjacent upland habitat and tidal transition zones, which act as important travel corridors for wildlife of the tidal marshes. These areas are important for wildlife escaping high-tide events, particularly salt marsh harvest mice and Ridgway's rails. The migration habits of the Baylands' wildlife coincide with tidal flows, with many species moving through the tidal wetland habitat via channelized streams, tidal marsh vegetation, and riparian corridors. Figure 4 shows migration pathways.

Human-made features such as the trails and levees intersecting the Baylands may act as travel corridors for interior mammalian species to reach more outer portions of the tidal flats that are not normally accessible by overland travel. Local wildlife species known to use these structures for travel include coyote (*Canis latrans*), mule deer (*Odocoileus hemionus*), gray fox (*Urocyon cinereoargenteus*), striped skunk (*Mephitis mephitis*), bobcat (*Lynx rufus*), and raccoon (*Procyon lotor*).

These corridors may also be accessed by feral cats (*Felis catus*) and other nonnative terrestrial species, exposing marshland wildlife populations to increased predation pressures. Nonnative predators such as feral cats and red foxes (*Vulpes vulpes regalis*) have been shown to prey on Ridgway's rails, light-footed clapper rails (*Rallus longirostris levipes*), and California black rails during high-water events (Evens and Page 1986; Foin et al. 1997; Harding et al. 2001).

These same human-made features are known to create passage obstacles for wildlife species in tidal marshes, particularly during storm surges and extreme high tides (Eddleman and Conway 1998). Human-made levees, dikes, and seawalls may obstruct dispersing Ridgway's rails and other rail species, which are less mobile and rely on vegetation cover for movement. Similarly, salt marsh harvest mice will move to denser upland vegetation but may become stranded on levees and other structures during extreme high-tide events, leaving them vulnerable to predation.

2.6. Mitigation and Restoration Areas

Restoration projects completed in the Baylands since 1988 include Harbor Point, the harbor itself, and the Emily Renzel Wetlands. The Harbor Point project, completed in 1997, restored 11 acres of salt marsh. Since 1987, the former Palo Alto Harbor has been allowed to naturally fill with silt, with results observed in 2007 indicating that enough natural silting had occurred to provide soil to support plants. The Emily Renzel Wetlands, a beneficial use project completed in 1992, created a 15 acre freshwater marsh through installation of an earthen berm and a pipeline that extends from the RWQCP that provides tertiary treated wastewater to the freshwater marsh. Water from the freshwater marsh flows back into Matadero Creek to the East of the freshwater marsh. The restoration project also restored 12 acres of saltwater marsh along the northern edge of the former ITT property. The saltwater marsh is connected to the former yacht harbor via pipe, allowing muted tidal flow to occur. Water from the restored freshwater marsh also is discharged into Matadero Creek to the north of the freshwater marsh outfall. Previous and ongoing restoration efforts are illustrated in Figure 7.

Byxbee Park is a former landfill that has been closed, capped, and converted to parkland with trails, restrooms, interpretive signage, and public art. Vegetation in Byxbee Park consists largely of nonnative grasslands, with four sets of "vegetation islands" that support native shrubs and other native plantings.

The *Palo Alto Baylands Master Plan* (City of Palo Alto 2008) identified four areas that may be considered potential future restoration sites:

- 28 acres from the Harbor/Duck Pond/Lagoon priority areas from the 1987 Santina Study,
- the 11-acre Mayfield Slough Remnant Marsh,
- the former ITT property, and a portion of the Los Altos Treatment Plant site.

3. Human Use

The Baylands have been used by people since the Ohlone tribe of the Bay Area used the tidal marshes for foraging and hunting. During the late 1800s, settlers established themselves in the area and utilized the marshlands for agriculture, constructing dikes and levees and filling the wetlands for development. In the past 50 years, continued land use changes and development have resulted in the presence of managed salt ponds, a landfill (converted to Byxbee Park), a communications station (the former ITT Property), the RWQCP, the Palo Alto Airport, and the Palo Alto Municipal Golf Course.

Today, the Baylands provide unique natural and recreational experiences for Bay Area communities. Facilities and intersecting trails throughout the Baylands allow wildlife viewing, hiking, bike riding, water sports, and use of public lands for art installations, viewing, and recreation. Acquisition of new properties and planned expansion of the trail networks will enhance access to the different sites on and surrounding the Baylands, while providing connectivity to other City park facilities and the surrounding communities including Palo Alto, East Palo Alto, and Mountain View.

3.1. Existing Trails

The Baylands, including Byxbee Park, contain the most extensive trails network in the City's open space system. More than 16 miles of multiuse trails provide access to the Baylands' unique mixture of habitats and wildlife (Figure 5). Trails within the Baylands also provide regional connectivity, including to the San Francisquito Creek Trail, which connects the Baylands to the Bay Trail and the city of East Palo Alto. Farther south, the Renzel Trail connects the Baylands to the city of Mountain View and points beyond. A pedestrian bridge at Embarcadero Road connects the Baylands to the greater Palo Alto area west of U.S. Highway 101.

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0 0.5 Miles

San Francisco Estuary Institute, 2017; AECOM, 2017; Save the Bay, 2017; Esri, 2017

FIGURE 7

Restoration Sites

Within the Baylands there are many popular trails for hiking and bicycling, including the 5.6-mile Adobe Creek Loop, 0.7-mile Duck Pond Loop, and 1-mile Marsh Front trails. Most Baylands trails are on flat, easy terrain and comply with the Americans with Disabilities Act, although the terrain on a few Byxbee Park trails is hilly and steep in places. Trails in the Baylands are constructed of oyster shell, baserock, or decomposed granite, or are paved. Many trails are located atop levees, and are designed to reduce impacts on habitat while still providing access for wildlife viewing. No trails currently exist on or connect to the newly acquired former ITT Property. Only one trail provides access to the Flood Control Basin; that trail floods during extreme rain events. The access to the Baylands Boardwalk from the Lucy Evans Baylands Nature Interpretive Center is currently restricted to a 200-foot segment while the boardwalk is undergoing rehabilitation.

Social trails (informal trails created by foot traffic from people or animals) occur throughout the Baylands, with the majority located in Byxbee Park. Other social trails are adjacent and parallel to the Adobe Creek Trail, on the Flood Control Basin side. These trails are often created when bicyclists, hikers, and runners look for more challenging terrain.

3.2. Other Public Access Areas

Other public access areas within the Baylands include the Palo Alto Baylands Sailing Station, the Baylands Athletic Center, the Palo Alto Municipal Golf Course, the Duck Pond, the EcoCenter (formerly Sea Scout House), the Lucy Evans Baylands Interpretive Center, picnic areas, and parking lots. The Palo Alto Sailing Station consists of a pier that leads to a dock via a gangway and provides Bay access for small hand-launched, nonmotorized boats such as kayaks, canoes, and sailboats, in addition to sailboards and windsurfing boards.

The Baylands Athletic Center is a 6-acre facility consisting of a lighted baseball field with a 500-seat grandstand, one lighted softball field with bleachers, a parking lot, restrooms, and concession facilities. The fields are scheduled for organized league play in the spring and fall and are open to casual users at other times (City of Palo Alto 2017). Many organized walking/running events begin at the Baylands Athletic Center. The Golf Course Reconfiguration Project added 10.5 acres of land to the Baylands Athletic Center site for future use.

The Palo Alto Municipal Golf Course is a 169.8-acre, 18-hole public golf course. Since summer 2016, the golf course has been undergoing reconfiguration, with 10.5 acres of existing golf course to be incorporated into the Baylands Athletic Center. Approximately 7.4 acres of the golf course will be incorporated into the San Francisquito Creek Joint Powers Authority's San Francisquito Flood Reduction Project. The reconfigured course will encompass approximately 156 acres and will include 18 holes, a clubhouse, a parking lot, a practice range, practice putting greens, and a new on-course restroom.

The Duck Pond is a very popular location of the Baylands for public access. It was built in 1930 as a saltwater swimming pool before being converted to a duck pond in 1947. The Duck Pond is no longer tidal or brackish and is filled with 8.5 million gallons of recycled water from the RWQCP. The Duck Pond area consists of the Duck Pond, an adjacent trail, a parking lot, and one portable toilet.

Across Embarcadero Road from the Duck Pond is the EcoCenter, formerly known as the Sea Scout House. Built in 1941 as a base for the Sea Scouts, the EcoCenter now houses the Environmental Volunteers, an environmental education nonprofit organization, and was rehabilitated in 2008. The EcoCenter is open to the public free of charge and includes touchscreen science displays, hands-on nature exhibits, and environmental education

programs. It serves as a launch point for Baylands hikers, and as a resource for marshland ecology education and the advancement of environmental stewardship in California.

The Lucy Evans Baylands Nature Interpretive Center is built on pilings at the edge of Harriet Mundy Marsh (Figure 5). The Baylands Nature Interpretive Center Improvements Project, completed in April 2017, added eight interpretive stations, improved deck access surrounding the center, nest platforms for swallows, and glass-viewing windows providing improved views of the marsh. The Baylands Boardwalk, located behind the center, extends to the edge of the marsh and into the Bay; however, the boardwalk is in poor structural condition and public access is restricted to a 200-foot segment of the boardwalk. Planned improvements to the Boardwalk will be completed by 2020.

A picnic area with four tables and barbeques is located adjacent to the Baylands Ranger Station. The picnic tables and barbeques are available on a first-come, first-served basis. Many of the public access areas described above are accessible via parking lots located throughout the Baylands (Figure 5).

3.3. Interpretive Messaging/Signage

Signage and interpretive messaging is located throughout the Baylands (Figure 5). Many different styles of signage are present, including wayfinding signs, trail marker signs, signs listing park regulations, and interpretive displays. Signs are made of various materials including rustic wood, aluminum, and other weather-resistant panels.

Interpretive messaging is found throughout the park and describes environmental processes, wastewater treatment processes at the Emily Renzel Wetland, and descriptions of wildlife and habitats that occur within the Baylands. Like the other signage in the Baylands, the interpretive messaging comprises multiple graphic designs, styles, and materials.

3.4. Public Art

Palo Alto has supported public art since the 1970s, and the City's collection includes more than 300 pieces. A few of the treasures of the outdoor collection are located in and around the Baylands and include murals, land art, and sculptures (Figure 5). The largest public art work by Peter Richards and Michael Oppenheimer is located in the Byxbee Park Hills and comprises several elements that were installed around 1990, including the K-rail chevrons, the pole field, the keyhole, and the wind/wave structure. Other pieces of public art located in the Baylands include sculptures such as *Bliss in the Moment* by James Moore, located along Embarcadero Road at the Flood Control Basin; *Riding the Currents* and the companion mural *Currents*, both by Martin Webb, at the RWQCP; *Kaikoo V* by Betty Gold at the entrance to the Palo Alto Municipal Golf Course; and *Streaming* by Ceevah Sobel at the pump station at Embarcadero Road and San Francisquito Creek. The *City of Palo Alto Public Art Master Plan* (City of Palo Alto 2016) proposes additional installations throughout the Baylands, including opportunities at the Friendship Bridge and Adobe Creek Bridge and throughout Byxbee Park. The Public Art Master Plan also recommends developing a public art plan specific to the Baylands and the Embarcadero Road corridor east of Highway 101.

3.5. Nonrecreational Features and Facilities

Palo Alto Airport

The 101-acre Palo Alto Airport, located north of Embarcadero Road, is a general-aviation field owned and operated by the City. It has one paved runway measuring

approximately 2,443 feet by 70 feet and is the 10th busiest single runway airport in California.

Regional Water Quality Control Plant

The 25-acre RWQCP is operated by the City and treats wastewater for Los Altos, Los Altos Hills, Mountain View, Palo Alto, Stanford University, and the East Palo Alto Sanitary District. The facility has significantly reduced the amount of pollutants in the Bay by removing organic pollutants from wastewater. Recycled water from the RWQCP is used to fill the Duck Pond, and freshwater effluent flows into unnamed slough within the Baylands. Recycled water from the plant is also used to irrigate restoration sites within the Baylands.

Former ITT Property

The 36.5-acre former ITT Property located in the Emily Renzel wetlands was acquired by the City in 2016 and has been dedicated at parkland. The former antenna field was originally part of a 200-acre marshland area purchased and built into a radio telegraph transmitting station to serve as the hub of Pacific Coast ship-to-shore communications. The 200 acres were bought by ITT in 1930 and later recognized as an integral part of the Baylands rehabilitation plan in the 1970s. The City purchased 154 acres in 1977 and dedicated the property as parkland in 1982, excluding the 36.5-acre easement that remains in use by ITT.

There are two buildings and 22 antennas on the former ITT Property. The buildings have been determined to be eligible for the National Register of Historic Places. The *Palo Alto Baylands Master Plan* (City of Palo Alto 2008) contains recommendations for removing the antenna field and replacing it with marshland, with the goal of unifying the land with the rest of the Baylands.

Tide Gate

The tide gate, located at the end of Mayfield Slough, includes a two-way gate that allows Bay water to flow into the Flood Control Basin under controlled conditions. Improvements to the tide gate were made in 1993 and 2002 to maintain the marsh environment within the Flood Control Basin. Baylands rangers are responsible for operating the tide gate, with the objectives of allowing adequate space within the Flood Control Basin for rain flow from Adobe, Matadero, and Baron creeks; managing habitat in the Flood Control Basin; and controlling vectors in the basin. A bridge over the tide gate connects Byxbee Park with the Adobe Creek Loop Trail (Figure 5).

Palo Alto Flood Control Basin

The 618-acre Flood Control Basin collects flows from Adobe, Matadero, and Baron creeks and includes Mayfield Slough (Figure 5). The basin was built in 1956 to prevent floods in Palo Alto. The water level in the Flood Control Basin is typically between -2.2 and -2.0 feet. The basin comprises muted tidal wetland habitat (see Section 2.2, “Habitat Areas”). Historically the flood basin was salt marsh, and since the 1930s a levee system and tide gate (see above) have reduced salt water flow into the basin.

Other Nonrecreational Facilities

Other nonrecreational facilities in the Baylands include the plant nursery, the Baylands Ranger Station, restrooms, water fountains, public phones, and garbage cans (Figure 5). The plant nursery (described further in Section 4.1 below) is operated by Save the Bay and includes the nursery, a shade structure, and a shed. The ranger station is housed in the former Harbor Master’s House adjacent to the Duck Pond. The station is on the City’s Historic Resources Inventory List.

4. Existing Land Uses and Frequency/Volume of Use

4.1. Plant Nursery

The plant nursery, located near the Duck Pond, is operated by Save the Bay, a nonprofit organization that has partnered with the City of Palo Alto for habitat restoration, habitat enhancement, removal of invasive/nonnative plants, and environmental education at the Baylands. The plant nursery was built in 2004 and includes the nursery, a shade structure, and a shed. The entire plant nursery is located on City-owned property (Figure 5).

The fruitful partnership between Save the Bay and the City produces approximately 20,000 plants per year from the plant nursery (Olson, pers. comm., 2017). Of these, approximately 8,000 plants are installed in the Baylands each year, and 12,000 plants are installed at other Save the Bay restoration sites around the Bay. The plant species grown at the nursery are specific to upland and marsh transition zones and comprise more than 40 species, depending on project needs. Seeds collected for plant propagation are collected as close to the restoration sites as possible, and strict phytopthora control measures are in place at the plant nursery.

4.2. Volunteer Programs

The Baylands are home to several volunteer programs, including Ranger programs, partnerships with Save the Bay and Grassroots Ecology, and one-off efforts such as Boy Scouts projects and 1-day volunteer events by school classes (Bicknell, pers. comm., 2017). Save the Bay relies heavily on volunteers to accomplish their objectives in the Baylands. Volunteers for Save the Bay focus on plant propagation at the plant nursery, removal of nonnative/invasive species and weeding, and installation of native plants. Baylands rangers work closely with Save the Bay and Grassroots Ecology to focus volunteer efforts on habitat restoration and enhancement.

4.3. Organized Recreational Camps and Programs

Organized programs and recreation camps at the Baylands are offered by the Baylands rangers and partners including Bay Camps, Environmental Volunteers, Palo Alto Junior Museum and Zoo, and the Audubon Society. Active programs led by the Baylands rangers include hikes, canoeing with a ranger, and bike riding with a ranger. These programs are designed to attract visitors to the Baylands and to teach them about the area's history and ecology. Additionally, Baylands rangers offer programs to the public, school groups, families, scout troops, and other City departments that focus on pollution in the Bay, the history of the Baylands, and bird identification.

Other programs in the Baylands focus on environmental education. The City-operated Bay Camp, a weeklong science camp for students in kindergarten through sixth grade, engages youth in activities to educate them about the Baylands and Bay ecology. Similarly, Environmental Volunteers hosts environmental education programs at the EcoCenter, including hands-on programs and interactive displays and exhibits. The Junior Museum and Zoo and the Audubon Society also offer programs for groups of elementary school–age children to learn about the Baylands.

4.4. Recreation

Recreation at the Baylands includes running, hiking, biking, kayaking, canoeing, windsurfing, dog walking, fishing, hunting, sailing, paddle boarding, and kite-surfing. Casual users engage in the majority of recreation at the Baylands; however, organized running activities such as the Moonlight Run & Walk also occur. Groups of 25 or more must obtain a use permit for all activities in the Baylands. Additional recreation activities in the Baylands include picnicking, open-air painting, birdwatching, geocaching, wildlife observation, operation of amateur ham

radios, and barbequing.

4.5. Nonrecreational Uses

Nonrecreational uses of the Baylands are largely confined to roads and parking lots and include test-driving of cars from nearby dealerships, driving lessons, and photography of vehicles for sale (Bicknell, pers. comm., 2017). Other nonrecrational facilities are described in Section 3.5, "Nonrecreational Features and Facilities."

5. Existing Management and Maintenance Practices

The Faber-Laumeister Tract is located partially within East Palo Alto and San Mateo County. The City of Palo Alto co-manages the Faber-Laumeister Tract in close cooperation with the USFWS, Don Edwards Francisco Bay National Wildlife Refuge, and the City of East Palo Alto.

5.1. Vegetation Management

5.1.1. Invasive Species Control

The City of Palo Alto has an integrated pest management protocol in which using chemicals in pest management is minimized or avoided altogether. As a result, controlling invasive species in the Baylands involves frequent mowing and hand pulling of invasive species. Pest management control with a weed torch is sometimes used in areas that cannot be mowed (Bicknell, pers. comm., 2017).

Spartina alterniflora has been a concern in the Baylands since 1997 when it became a threat to displace native cordgrass. The California Coastal Conservancy's San Francisco Estuary Invasive Spartina Project has conducted treatment of invasive spartina annually since 2002. Methods of control included hand application of herbicides. The treatment of spartina has been very effective in controlling the spread of invasive spartina in the Baylands.

Nonnative *Phragmites australis* is dominant in the Flood Control Basin (Figure 6). Approximately 22 acres of phragmites were treated with herbicide under a grant from the local Water District. However, the control was not successful and phragmites continues to dominate the Flood Control Basin (Anderson, pers. comm., 2017).

5.1.2. Irrigation

Habitat restoration and enhancement sites are irrigated largely by hand, using reclaimed water from the RWQCP (Bicknell, pers. comm., 2017; Olson, pers. comm., 2017). Baylands rangers water once per month during the winter as needed, and two to three times per month in the spring and summer. The amount of water used for irrigation varies by season, with water use being as high as 3,800 gallons per month in the summer months. Save the Bay irrigates habitat restoration and enhancement areas by hand up to four times per year, but usually waters new plantings only once per year.

The "vegetation islands" at Byxbee Park are irrigated from a 2,000-gallon water tank, using reclaimed water from the RWQCP. This mechanical irrigation system uses the leachate air system to pump water to the irrigation lines. The system is largely experimental and resulted from a focus on habitat, trees, and shrubs during the public visioning phase of the planning process for landfill closure.

5.1.3. Routine Vegetation Management

Routine vegetation management is the responsibility of the Baylands rangers and consists largely of mowing vegetation along the edges of trails to allow public access.

Rangers also mow other grassy areas for fire control. In addition to mowing, Rangers regularly trim shrubs and trees, particularly around trails, to allow public access to the Baylands.

5.2. Restoration Practices

Restoration efforts consist largely of enhancing existing habitats to improve ecosystem function. The Baylands rangers work closely with partners such as Save the Bay and Grassroots Ecology to utilize volunteers to focus on removing nonnative species and planting native species. Previous and ongoing restoration efforts are illustrated in Figure 7. Restoration activities vary by season: planting occurs largely in the fall and winter; plants are propagated in the spring and summer; and nonnative plants are removed year round, with more concerted efforts in the winter and summer.

Areas of the Baylands that are prioritized for restoration or enhancement are those that are easily accessible to volunteers, can be addressed during the available volunteer hours, or have been identified in the field as potential restoration areas. See Section 2.6, "Mitigation and Restoration Areas," for areas that have been identified in the *Palo Alto Baylands Master Plan* as potential restoration sites.

Mowing or weed-whacking is the first step in preparing a site for restoration or enhancement. This action is typically undertaken in the spring or summer. Preparation begins with soil amendments, such as sheet mulching using cardboard or wood chips. The mulch is then placed on the restoration site and left for a season, usually summer. After mulching, the site is planted with native plants from the plant nursery, usually in fall or winter. The site is then maintained through hand pulling of nonnative and weedy species. The new plantings are irrigated as needed; however, seasonal precipitation in the fall and winter is often enough to aid in the establishment of the plantings. Save the Bay conducts quantitative monitoring for vegetative cover at sites where it has conducted restoration and enhancement. Baylands rangers do not conduct quantitative monitoring on sites where they have conducted restoration.

5.3. Wildlife Management

The U.S. Department of Agriculture has provided predator control services in the Baylands on and off over the past 20 years, with the objective of protecting endangered species such the Ridgway's rail and burrowing owl from mammalian predators. Target species for control include feral/free-ranging cats, raccoons, striped skunks, red foxes, and feral/free-ranging dogs.

The *Byxbee Park, Interim Park Conceptual Narrative* includes a management plan for the western burrowing owl (City of Palo Alto 2015). This plan includes areas set aside for burrowing owl nesting habitat. The plan calls for nesting habitat that includes artificial burrows seeded with grasses. However, because this plan requires burrowing into the landfill cap, it required approval from regulatory agencies. The park's conceptual plan calls for creating burrowing owl foraging habitat by mowing areas of the park to different heights or leaving it unmowed, and creating the "vegetation islands" to create habitat for insects. The plan includes recommendations for ground squirrel management and control, public access areas, control of feral cats, and habitat monitoring. As a condition of the permits required for landfill closure, ground squirrel abatement is currently implemented in Byxbee Park. The City is attempting to balance the ecosystem benefits that squirrels provide with the regulatory requirements imposed. The purpose of ground squirrel control is to project the clay cap layer that encases and seals buried refuse and contains methane within the sealed area.

5.4. General Maintenance

Other maintenance and management activities in the Baylands include controlling litter and installing and rehabilitating park facilities such as benches, tables, and fences. General maintenance also includes trail maintenance activities such as trailside mowing, tree and shrub trimming, and general upkeep.

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