

CHAPTER 3: AFFECTED ENVIRONMENT

INTRODUCTION

This chapter describes the project area's natural, social, and economic environments, with particular emphasis on those elements that could be affected by the project under consideration. Such descriptions not only provide greater insight into the issue areas of concern, they also establish a baseline against which potential impacts of the alternatives can be compared. The following sections focus on the current status of each element and any trends that may be evident. The environmental resources and topics discussed in this chapter are the same and presented in the same order as in Chapter 4—Environmental Consequences.

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3.1 GEOLOGY, SOILS AND SEISMICITY

This section provides a summary of geologic resources that are known or might be present in the vicinity of the proposed 34th America's Cup (AC34) project and could be affected by (or have an effect on) the various events or structural components associated with the project. As used by the National Park Service (NPS), the term “geologic resources” refers to both geologic features and geologic processes. Geologic features include unique, exemplary, or outstanding rock outcrops, erosional formations, or landscapes that represent a significant public recreational or aesthetic attraction or that offer significant scientific or educational value. Geologic processes are the natural, physical, and chemical forces that act within natural systems and on human developments across a broad spectrum of space and time. Such processes include, but are not limited to, weathering, erosion and sediment transport, glaciation, karst processes, shoreline processes, and seismic and volcanic activity. As defined here, fossils and fossil-containing formations would also be considered a geologic feature; however, paleontological resources are dismissed from further consideration in Chapter 1. Sediment transport is also a geologic process; however, impacts of sedimentation and dredging are discussed in Section 4.2, Hydrology and Water Quality.

The affected environment relevant to the proposed AC34 project is described in terms of the general geologic setting, specific geologic and soil resources, and natural hazards that might affect or be affected by the AC34 events. Where necessary, the affected environment is described individually for each of the AC34 sites within federally managed lands, or for AC34 activities or actions requiring federal approvals. The study area associated with geology and soils impacts would be all landside federal lands upon which AC34 venues have been proposed or that would likely serve as secondary race viewing locations. This section focuses on locations in the study area where facilities would be built, and that are likely to receive a large amount of foot traffic, either at established AC34 spectator venues or at secondary viewing locations.

3.1.1 Regional Geologic Setting

San Francisco is located in the northern portion of the San Francisco peninsula, which is part of the geologically complex California Coast Ranges geomorphic province (Norris and Webb 1990). The Coast Ranges province is characterized by a series of northwest-trending ridges and valleys that run roughly parallel to the San Andreas fault zone and can be further divided into the northern and southern ranges that are separated by San Francisco Bay. San Francisco Bay lies within a broad depression created from an east-west expansion between the San Andreas and the Hayward fault systems. The San Andreas fault, the Hayward fault, and associated subsidiary faults are indicators of the tectonic forces that characterize the margin between the Pacific Plate and the North American Plate, where the Pacific Plate slowly creeps northward past the North American Plate. The Bay and northern portion of the San Francisco peninsula are within a structural down-dropped block between the northern Santa Cruz Mountains to the west and Diablo Mountain Range to the east. Much of the Coast Range province is composed of sedimentary deposits and volcanic rocks, including dune sands at Crissy Field, artificial fill at SAFR, and older, stiffer Franciscan bedrock made up of sandstones, chert, greenstone, greywacke and shale that underlie hillsides likely to be used as secondary viewing areas.

3.1.2 Geologic Features and Soil Resources

The following description of geologic and soil resources is derived from the NPS Geologic Resources Inventory (GRI) program and the NPS Soil Resources Inventory (SRI), which seek to evaluate the geologic resources of all national park units designated as having significant natural resources (NPS 2009, NPS 2011). Geographic information systems (GIS) data related to the Golden Gate National Recreation Area (GGNRA), as well as Point Reyes National Seashore and Fort Point National Historic Site, were reviewed to describe the geologic and soil setting of the AC34 project. The following geologic and soil units are considered a geologic resource as defined above, based on their relative rarity, sensitivity to disturbance, and ability to support rare and endangered plant species (NPS 2009; NPS 2011; Elder 2001; Presidio Trust 2002):

- Serpentinite rock and serpentine soil
- Colma Formation and other coastal sand dunes
- Wetland soils (hydric soils)

None of the soil units in the study area, as mapped by the Natural Resources Conservation Service (NRCS), are characterized as hydric soils (soils formed under conditions of saturation, flooding, or ponding), which are important in supporting unique wetland vegetation (NPS 2011). However, some constructed wetlands do exist in the study area, as further described below. Each of the AC34 locations analyzed in this EA, and the sensitive geologic and soil resources they contain, are further described below.

3.1.2.1 *Crissy Field*

Crissy Field is a former military airfield that was part of the United States Army base at the Presidio (described below) and became part of the GGNRA in the 1990s. Crissy Field has undergone a major habitat restoration that included the conversion of approximately 22 acres of former airstrips into a tidal marsh with interpretive paths.

Geologic mapping of the region identifies the flat portions of Crissy Field as being underlain by a mixture of artificial fills and beach sand (NPS 2009). Further, the Natural Resources Conservation Service has mapped Crissy Field as being primarily underlain by “urban land” and “orthents” soil units (NPS 2011). Orthents are soils that lack horizon development due to either steep slopes or parent materials that contain no permanent weatherable minerals. Typically, Orthents are exceedingly shallow soils. These soils are generalized map units representing disturbed areas or soil units that for other reasons have not developed natural soil horizons or distinct organic topsoil. Neither of these soil units is defined as hydric soils, although recent restoration of the tidal marsh has supported and continues to support the development of wetland vegetation communities. The heavily vegetated bluffs located between Crissy Field and Doyle Drive are underlain by the Colma Formation and Younger Dune Sands to the east and serpentine rocks of the Franciscan Complex to the west (NPS 2009).

3.1.2.2 The Presidio

The Presidio is situated at the southern base of the Golden Gate Bridge, along San Francisco's northern shoreline. The Presidio is a former United States Army post and was one of the oldest continuously operating military posts in the nation until it was transferred to civilian use in 1994. The Presidio's coastal bluffs are arguably one of the last undeveloped areas left in San Francisco. The Presidio Trust Management Plan (PTMP) states that "the Presidio contains some fragile geologic resources, including the Colma Formation dunes, and the serpentine outcrops and bluffs at Inspiration Point and south of Crissy Field" (Presidio Trust 2002). Eight of the 12 rare plants found at the Presidio—including the federally endangered Presidio clarkia and Raven's manzanita, the latter of which is represented by a single plant—grow on serpentinite. Some species are confined to just one or a few outcrop areas.

The northern edge of the Presidio, from the Golden Gate Bridge and Fort Point east to Battery East and in the vicinity of Lincoln Boulevard, contains bluff-top locations that offer several prime locations for elevated, panoramic views of Central San Francisco Bay. These locations include the Crissy Field overlook on Lincoln Boulevard, Inspiration Point, the Bay Trail, and Battery East (see Section 3.9, Visual Resources). These areas are mapped as containing a combination of artificial fills, slope and ravine debris, undifferentiated surficial deposits, and serpentine rocks (NPS 2009). Soils in the area mapped as "rock outcrop-orthents" reflect the underlying slope-forming serpentine rock of the northern Presidio (NPS 2011). The serpentinite rock is mapped between Lincoln Boulevard and Mason Street, and also along sloped areas paralleling the northwestern end of Crissy Field Avenue, all of Long Avenue, and the southern half of Marine Drive. Serpentine rock also underlies the sloped areas south of Fort Point and North of the Golden Gate Bridge visitor center. These areas are likely to serve as access to desirable secondary viewing locations. The undifferentiated surficial deposits located south of the bluffs in the interior of the Presidio are composed primarily of clay and silt (NPS 2009). Areas in the western half of the Presidio, south of Mason Street, also offer elevated Bay views, although the underlying Colma Formation and Younger Dune Sands (NPS 2009) result in less abrupt elevation changes, and views are more frequently blocked by structures and trees.

3.1.2.3 Aquatic Park

Aquatic Park is located in the San Francisco Maritime National Historical Park and managed by the NPS. Aquatic Park is located at the west end of Fisherman's Wharf, starting west of Hyde Street and extending to Fort Mason, just west of Van Ness Avenue. It includes a beach, a semi-circular concrete tiered seating area, grassy lawn areas, and the horseshoe-shaped Municipal Pier extending into the Bay. As a largely developed area, the site is mapped as being wholly underlain by artificial fill (NPS 2009). The only unpaved areas consist of lawns, landscaping, and beach sand.

3.1.2.4 Fort Mason

Fort Mason is a former United States Army post and military port facility and contains historic buildings, public open spaces, piers, and warehouses. The piers, warehouses, and port facility are built over artificial fill, whereas the rest of the facility is built atop a hill made up of sandstone and shale of the Franciscan Complex overlain by a veneer of dune sands and artificial fill (NPS 2009). Locally, the eastern edge of

Fort Mason is also underlain by slope debris and/or ravine fill. Several rock outcrops can be observed along the Bay Trail, which wraps around the northern end of the hill.

3.1.2.5 Alcatraz Island

Alcatraz Island (Alcatraz) consists of 22 acres and is located approximately 1.5 miles offshore from San Francisco. Alcatraz is a former Civil War outpost that later served as a federal prison until 1963. Alcatraz is formed by a bedrock outcrop composed of sandstone and shale of the Franciscan Complex. Some areas are locally underlain by artificial fills associated with development of the prison complex, and others are deeply eroded ravines that are underlain by slope debris and ravine fills (NPS 2009). One small landslide is mapped on the southern edge of the island (NPS 2009).

3.1.2.6 Marin Headlands and Fort Baker Pier

The Marin Headlands, including Fort Baker, is underlain almost entirely by rocks of the Franciscan Complex, consisting of alternating and often times chaotically mixed layers of greenstone, chert, and sandstone (NPS 2009). The radiolarian ribbon chert is resistant to weathering and therefore forms many of the most visible ridge tops and rock outcrops. The chert is thinly bedded, has a characteristic dark red rusty color, and is intensely folded. The relative resistance to weathering and the thinly bedded nature of the rock formation clearly reveals prominent and complex sharp-crested fold structures in the rock. The regional occurrence of chert is thought to reflect 100 million years of pelagic deposition and is one of the longest stratigraphic sequences of chert in the world (Elder 2001). The bedrock surrounding Fort Baker is primarily composed of greenstone, an altered submarine volcanic rock that supports fairly thick clay-rich soils (NPS 2011). Generally, the southern tip of the Marin peninsula is characterized by steeply sloped, landslide-prone topography of the Northern Coast Ranges geomorphic province. Visitors to AC34 events are likely to use desirable viewpoints at established vistas on the north end of the Golden Gate Bridge, along roadside pulloffs on East Road, at Fort Baker, and on the Sausalito Boardwalk.

3.1.3 Natural Hazards

3.1.3.1 Faulting and Seismicity

The major active faults within 20 miles of the project area are the San Andreas, Hayward, Calaveras, Healdsburg-Rodgers Creek, Concord-Green Valley, and the San Gregorio faults. **Table GEO-1** summarizes the distance from the project area, direction to the fault, and the estimated maximum earthquake moment magnitude (M_w) for each fault located within approximately 30 miles (50 kilometers) of the project area.

An earthquake is classified by the amount of energy released, expressed as the magnitude of the earthquake. Traditionally, magnitudes have been quantified using the Richter scale. However, seismologists now use a moment magnitude (M_w) scale because it provides a more accurate measurement of the size of major and great earthquakes. Moment magnitude is directly related to the average slip and fault rupture area.

TABLE GEO-1: MAJOR ACTIVE SAN FRANCISCO BAY AREA FAULTS IN THE NEAR VICINITY OF THE PROJECT AREA

Fault Name	Age ^a	MHE ^b	Mw ^c	Approximate Distance from Project Area ^d
San Andreas	Historic	7.8 (1906)	7.9	7 miles
Hayward	Historic	6.8 (1868)	7.1	10 miles
Calaveras	Historic	6.5 (1861)	6.8	25 miles
Healdsburg-Rodgers Creek	Historic	6.3 (1898)	7.0	25 miles
Concord-Green Valley	Historic	5.4 (1955)	6.9	27 miles
San Gregorio (Seal Cove)	Holocene	3-6.4 (AD 1270-1400)	7.3	20 miles
Mount Diablo Thrust	Quaternary (possibly active)	n/a ^e	6.7	26 miles

NOTES/SOURCES:

^a Holocene faults are those that have shown geologic evidence of movement within Holocene time (approximately the last 11,000 years). Historic faults are Holocene faults that have also demonstrated fault movement within the last 200 years. Quaternary faults have demonstrated displacement within last 1.6 million years. The Mount Diablo fault is a blind fault, meaning there is no surface expression of the fault, making dating its pre-historic activity difficult.

^b MHE = Maximum Historic Earthquake. The magnitude is provided as the Richter magnitude, based on measurements or inferred from geologic and observed evidence of earthquake effects. Source: United States Geological Survey (USGS), "Historic United States Earthquakes," available on the Internet at <http://earthquake.usgs.gov/earthquakes/states/historical_state.php>, viewed on May 6, 2011.

^c Mw = Maximum Moment Magnitude Earthquake (Mw). Moment magnitude is related to the physical size of a fault rupture and movement across a fault and provides a physically meaningful measure of the size of a faulting event. Source: California Geological Survey (CGS), *Probabilistic Seismic Hazard Assessment For The State Of California, Appendix A: Fault Source Parameters*, revised in 2002, from CDMG Open File-Report 96-08, available on the Internet at <<http://www.consrv.ca.gov/CGS/rghm/psha/ofr9608/>>, 2002.

^d Distance obtained from Jennings, C.W. and Bryant, W.A., compilers, California Geological Survey (CGS), *2010 Fault Activity Map of California*, CGS Geologic Data Map No. 6, also available on the Internet at <<http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html>>, 2010.

^e n/a = not applicable.

Since 1800, four major earthquakes have been recorded on the San Andreas fault. In 1836, an earthquake with an estimated M_w of 6.4 occurred east of Monterey Bay (San Juan Bautista) on the San Andreas fault (CGS 2011a). Shortly thereafter, in 1838, an earthquake with an M_w of about 7.5 occurred on the San Andreas fault. The San Francisco earthquake of 1906 caused the most significant damage in the history of the Bay Area in terms of loss of lives and property damage. This earthquake created a surface rupture along the San Andreas fault from Shelter Cove to San Juan Bautista, approximately 290 miles in length. It had an M_w of about 7.9 and was felt 350 miles away in Oregon, Nevada, and Los Angeles. The most recent large earthquake to affect the Bay Area was the Loma Prieta earthquake on October 17, 1989. The epicenter of this earthquake was approximately 60 miles from the project area in the Santa Cruz Mountains. The earthquake had an M_w of 6.9.

On the Hayward fault, an earthquake with an estimated M_w of 6.8 occurred in 1868 on the southern segment (between San Leandro and Fremont). In 1861, an earthquake of unknown magnitude (probably an M_w of about 6.5) was reported on the Calaveras fault. The most recent significant earthquake on this fault was the 1984 Morgan Hill earthquake with an M_w of 6.2.

The United States Geological Survey (USGS) estimates that there is a 63-percent probability of a strong earthquake (M_w 6.7 or higher) occurring on one of the regional faults in the 30-year period between 2007 and 2036 (USGS 2008).

3.1.3.2 Earthquake Shaking and Liquefaction

The intensity of earthquake-induced ground motions and the potential forces affecting structures within the project area can be described in terms of “peak ground acceleration,” which is represented as a fraction of the acceleration of gravity (g). Acceleration of gravity (g) is measured as 980 centimeters per second squared. One (1.0) g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds. The California Geological Survey estimates that the peak ground accelerations that have a 10-percent probability of exceedance in 50 years (or a 1 in 475 chance of occurring in any given year) range from 0.47 g to 0.53 g for the project area along the northern San Francisco waterfront (CGS 2011b). These estimates of peak ground accelerations are used primarily for formulating building codes and for designing buildings, and are not intended for site-specific hazard analysis. Based on shaking hazard mapping done by the Association of Bay Area Governments (ABAG), it is expected that the San Francisco shoreline within the project area would experience violent groundshaking in the event of a large earthquake along the peninsula segment of the San Andreas fault, and very strong to violent groundshaking in the event of a large earthquake along the combined northern and southern segments of the Hayward fault (ABAG 2011).

Much of the landside portion of the San Francisco shoreline, including the sites where project construction would occur, is within a liquefaction hazard zone identified by the California Geological Survey (CGS 2000). Artificial fill present along the northern San Francisco waterfront, especially any fill placed before the 1960s, is considered susceptible to liquefaction. Because fills were generally not emplaced using modern engineering compaction techniques to increase their liquefaction resistance, these largely unconsolidated to semi-consolidated sediments are vulnerable to liquefaction and amplification of strong ground motions (Hitchcock et al. 2008). There is considerable variation in the type, depth, age, and nature of fill, depending on the source of the fill and original configuration of the Bay shoreline.

3.1.3.3 Tsunami

Tsunamis (seismic sea waves) are long period waves that are typically caused by underwater seismic disturbances, volcanic eruptions, or submerged landslides. Low-lying coastal areas such as tidal flats, marshlands, and former Bay margins that have been artificially filled but are still at or near sea level are generally the most susceptible to tsunami inundation.

In 2009, the California Geological Survey, the California Emergency Management Agency, and the Tsunami Research Center at the University of California completed the state’s official tsunami inundation maps. Based on this mapping, the majority of the project area is located in an area identified for potential inundation in the event of a tsunami or seiche (CGS 2011c). The mapping considers a multitude of tsunami sources, many of them very distant; a single event may not necessarily cover the areas mapped, and would likely result in a smaller runup. The potential tsunami and seiche runup varies from approximately 6 feet near Pier 80 to approximately 14 feet near Crissy Field (CCSF

2011). In the Pier 27 area, the potential runup is approximately 10 feet, and at Marina Green the potential runup is approximately 12 feet.

The earthquake that hit Japan in March 2011 initiated a tsunami that traveled for 10 hours before reaching the California coast; the runup in this event was less than 2 feet (CGS 2011c). When the tsunami warning was issued, coastal county offices of emergency services were able to use the state's official tsunami inundation maps to focus their response.

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3.2 HYDROLOGY AND WATER QUALITY

This section describes the existing hydrology and water quality in the project area, with a focus on San Francisco Bay and areas that are under federal jurisdiction or would be subject to federal permitting actions. Surface water features are discussed along with water quality conditions within the project area.

3.2.1 Surface Water Hydrology and Water Quality

3.2.1.1 *San Francisco Bay*

San Francisco Bay is a large, complex, and highly dynamic estuarine environment that receives saltwater inputs from the Pacific Ocean. San Francisco Bay is relatively shallow with an average depth of approximately 20 feet and a median depth of approximately 7 feet at mean lower low water (RWQCB 2008). Because San Francisco Bay is directly connected to the Pacific Ocean (via the Golden Gate), the Bay exhibits a twice-daily tidal cycle. These tidal cycles correspond with two high and two low water levels each day. Currents in San Francisco Bay result primarily from tidal flows through the Golden Gate and into the southern and northern portions of the Bay and the Sacramento-San Joaquin Delta. During rising tidal conditions, currents flow generally east along the northern flank of Treasure Island, and southeast along the eastern and western sides of Treasure and Yerba Buena islands. Other factors, including freshwater flows from the Delta and Bay watersheds, as well as wind effects, may also contribute to changes in currents. Even under heavy runoff and wind events, however, the Bay currents overwhelmingly reflect the tidal cycle (SFPorts 2009). The 34th America's Cup (AC34) event race course would be located within the western region of the Central Bay portion of San Francisco Bay.

3.2.1.2 *Hydrology and Stormwater Drainage*

Crissy Field

Crissy Field is located within the Presidio immediately west of the San Francisco Marina West Harbor. In 1999, tidal action was introduced into a restored 22-acre tidal marsh at Crissy Field located roughly 2,000 feet west of the entrance to the West Harbor. In May 2001, sand deposition at the inlet channel closed the marsh, and the Crissy Field marsh has continued to close and reopen intermittently since that time (PWA 2004). Monitoring studies have estimated that the existing average sand transport rate at Crissy Field is 25,000 cubic yards of sand per year, toward the east (Moffatt & Nichol 2004). Crissy Field also includes more than 1,000 paved and unpaved parking spaces. Precipitation runoff from Crissy Field flows directly into the tidal marsh or San Francisco Bay. Some subsurface drainage infrastructure exists beneath the former airfield and beneath the unpaved parking area at East Beach. The infiltrated runoff at these locations is directed either toward the marsh or toward the Bay.

Fort Mason

Fort Mason is located along the San Francisco waterfront, the majority of which opens directly into San Francisco Bay. Fort Mason is one of the AC34 venue areas located in San Francisco.

Aquatic Park

Aquatic Park, located at the west end of Fisherman's Wharf, extends west of Hyde Street to Fort Mason slightly west of Van Ness Avenue. The Hyde Street Pier is located north of Aquatic Park. Aquatic Park includes green space with benches, trees, and walkways, beach, and terminus of the Powell-Hyde cable car line. This area is situated in the North Shore sub-basin of the San Francisco Public Utilities Commission (SFPUC) combined sewer system, and natural drainage from Aquatic Park flows directly into San Francisco Bay.

Fort Baker

Located in the northwest portion of San Francisco Bay, Fort Baker Pier lies adjacent to Horseshoe Bay and within the boundary of Fort Baker, which is part of the Golden Gate National Recreation Area (GGNRA). Fort Baker has been identified as a secondary viewing area for the AC34 events. Fort Baker lies within a rectangular watershed covering approximately 0.5 square mile. A stream originally flowed through this watershed and was fed by a series of small tributaries from the adjacent valleys. This streambed was filled during historic development and the drainage was diverted to an underground pipe system that remains today (NPS 2009). Over time, a trunk line drainage system was developed to serve the entire developed Fort Baker area. This trunk line system consists of catch basins, pipes, and concrete-lined swales that drain to four major storm drain outfalls along the seawall at Horseshoe Bay (NPS 2009).

Additional surface runoff not captured by the stormwater system ultimately discharges to Horseshoe Bay by means of surface runoff or through shallow groundwater in the alluvial fill at the base of the hills. There are no permanent streams or ponds at Fort Baker within the project area (NPS 2009). Compacted, unpaved roads and parking areas within the project area function much like impervious surfaces, allowing surface water runoff to behave essentially the same as runoff on paved or roofed surfaces, and the fairly high clay content of the soil in the area further contributes to this condition.

Marin Headlands

Secondary viewing areas, including the Marin Headlands on GGNRA lands, may be used by spectator and visitors to view AC34 events in both 2012 and 2013, but would not be formal AC34 venue locations. Southeastern Marin County, where the Marin Headlands are located, includes areas with steep slopes and low-lying areas. The Marin Headlands are part of both the Richardson Bay Watershed for areas draining toward the bay and the South Coastal Watershed for areas that drain toward the Pacific Ocean. Changes to topography, vegetation, and watercourses, as well as the construction of roads, parking lots, buildings, trails, and other built features such as coastal artillery batteries and the parade grounds, have reduced the rates and volumes of surface water drainage within this watershed. The fairly high clay content in the soil further restricts surface water drainage (Moffatt & Nichol 2004). Ongoing soil erosion from increased surface runoff and the many areas of bare soil roads, parking, and trails is a problem in nearly all developed areas of the watershed (NPS 2009).

Alcatraz

Part of the GGNRA, Alcatraz Island has been identified as a secondary viewing area for the AC34 events. Alcatraz Island is characterized by impervious areas (rock outcrop or historic land use) with steep slopes and low-lying areas that flow directly into the Bay. No significant surface water features exist on the island. In general, Alcatraz Island consists of grassland, historic gardens, cliffs, historic buildings, and paved areas (NPS 2001). The hydrologic regime on the majority of Alcatraz Island has been altered by historic land use.

The Presidio

Located along the northern-most extent of the San Francisco peninsula, the topography within the Presidio ranges from the relatively flat coastal plain along the western and northern shorelines to approximately 400 feet in the south-central hilly uplands. The hydrology of the area is highly modified as a result of urban development; with the exception of Lobos Creek on the west side of the Presidio, no natural streams occur within these areas. There are three main watersheds within the Presidio: (1) the Lobos Creek watershed, (2) the western coastal watershed, and (3) the San Francisco Bay watershed. The Lobos Creek watershed and the western coastal watershed drain to the Pacific Ocean. The San Francisco Bay watershed drains to San Francisco Bay and is comprised of various types of land uses, including open space, residential, commercial, industrial, institutional, and special use (cemeteries and roads). The Tennessee Hollow subwatershed within the San Francisco Bay watershed contains three creek tributaries that drain to the restored wetland at Crissy Field (Baseline 2004). Open space in the Presidio is generally drained by overland flow and open channels. Natural drainage features within the more developed urban-type areas have been largely eliminated and/or altered by past grading, filling, and construction activities. Most of the urban areas now drain through the Presidio storm drain system in underground pipes and open channels along roads. In recent years, the Presidio Trust has made substantial improvements to the damaged system and has increased capacity to accommodate design flows. Unlike most of the City and County of San Francisco, the Presidio operates separate storm water and sanitary sewer systems (Baseline 2004).

3.2.1.3 Sites in San Francisco with Federally Regulated Project Activities

Project-related activities such as land improvements, in-water construction, and event viewing would occur along San Francisco waterfront piers and other water areas described below.

Project sites include water areas along the waterfront in which dredging would be conducted. These areas could include the Brannan Street Wharf (Piers 32-36) Open Water Basin, Piers 28-30 water area, a portion of the Rincon Point (Piers 14-22 ½) Open Water Basin, Pier 19-23 and Northeast Wharf (Piers 23-27) Open Water Basin, and Piers 29-31 water area. All of these basins open directly to San Francisco Bay. Dredging would be conducted in the water areas immediately north and south of Pier 14, between Pier 28 and Piers 30-32; and in the water area between Piers 30-32 and 32-36.

3.2.1.4 Water Quality in Central San Francisco Bay

Water quality in the Central Bay is saline and predominated by ocean influences. During periods of significant runoff, however, substantial freshwater migrates through San Pablo Bay and into San Francisco Bay from the Sacraments-San Joaquin River system. This inundation of freshwater can temporarily reduce the salinity of waters in the project vicinity to substantially less than ocean water (The Bay Institute 2003). Additionally, tidal currents influence circulation, flushing action, and water exchange within the Bay, thereby affecting sedimentation and water quality characteristics. Various contaminants are transported into San Francisco Bay by an assortment of sources including urban uses, industrial outfalls, municipal wastewater outfalls, municipal stormwater, upstream farming, upstream historic and current mining discharges, legacy pollutants, and various other pollutant sources. Legacy pollutants are constituents that are considered harmful to human health or the environment, that were historically emitted by industry or other human activities, and that are in general banned or significantly restricted from current usage. Examples include mercury, lead, PCBs, and DDT.

Pollutants are introduced into Central San Francisco Bay primarily through runoff, combined sewer overflows, stormwater discharges, spills and leaks, and remobilization of contaminants from sediment into the overlying water column. The Regional Water Quality Control Board (RWQCB) listed the Central Bay, which includes the project area, as an impaired water body. Under Section 303(d) of the Clean Water Act, impaired waters are defined as those that do not meet water quality standards, even after point sources of pollution have implemented pollution control technology. The pollutants listed for the Central Bay include chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, dioxin compounds, exotic species, furan compounds, mercury, polychlorinated biphenyls (PCBs), and selenium (RWQCB 2007). Pollutant levels vary seasonally and annually, dependent upon their specific source and degradation characteristics. Contaminants, such as ammonia, copper, and legacy pesticides, have decreased over recent years due to cleanup efforts and natural attenuation (RWQCB 2007; The Bay Institute 2003). Exotic species, also referred to as introduced, non-indigenous, alien, non-native, or invasive species, in the Central Bay are discussed in the analysis of marine biological resources.

Waters in San Francisco Bay are generally well oxygenated with typical concentrations of dissolved oxygen ranging from 9 to 10 mg/L during high periods of river flow, 7 to 9 mg/L during moderate river flow, and 6 to 9 mg/L during the late summer months when flows are lowest (USGS 2011). Approximately 800 million gallons of wastewater carrying 60 tons of nitrogen enters the San Francisco Bay annually (USGS 2011). Until the 1980s, nutrient enrichment was a major problem in the San Francisco Bay estuary. Prior to the 1980s, concentrations of ammonia and nitrogen in Bay waters were in excess of 15 mg/L. This level of enrichment led to algal blooms and anoxic conditions in portions of the Bay with poor water circulation, including large portions of the South Bay. Improvements in wastewater treatment caused a large decrease in nutrient loads entering the estuary. Concentrations today are less than 3 mg/L and no anoxic conditions are being recorded (USGS 2011).

Other water bodies within the project area that are identified as impaired water bodies under Section 303(d) of the Clean Water Act include Crissy Field Beach. Crissy Field Beach is listed for

bacteria; Islais Creek is listed for ammonia and hydrogen sulfide; Mission Creek is listed for ammonia, hydrogen sulfide, and polycyclic aromatic hydrocarbons.

The San Francisco Water, Power, and Sewer department works jointly with the San Francisco Department of Public Health (SFDPH) to administer a beach water quality monitoring program in San Francisco. Both agencies participate in the bacteriological sample collection which is then analyzed by the San Francisco Water, Power and Sewer Microbiology Laboratory. San Francisco Water, Power and Sewer is responsible for public notification when water quality does not meet state standards for water contact recreation, while the SFDPH is responsible for ensuring compliance with the California Sanitation, Healthfulness and Safety of Ocean Water-Contact Sports Areas Regulations, Title 17, California Code of Regulations. Fourteen sites are monitored weekly at beaches around the perimeter of San Francisco including:

- Candlestick Point State Recreation Area (Sunnydale Cove, Windsurfer Circle, and Jackrabbit Beach)
- Aquatic Park (Hyde Street Pier and Aquatic Park Beach)
- Crissy Field (Crissy Field East and Crissy Field West)
- Baker Beach (Baker Beach East, Baker Beach at Lobos Creek, and Baker Beach West)
- China Beach
- Ocean Beach (at the foot of Balboa Street, at the foot of Lincoln Way, and the foot of Sloat Boulevard)

Samples are analyzed for three different bacterial indicators of impaired water quality (total coliform, *Escherichia coli*, and enterococcus) by the quanti-tray method. Results are available within 18 to 24 hours of sample collection. Results for samples collected one day are not available until the next day due to the time it takes to perform the analysis. Beaches are posted and the public is notified 18 to 24 hours after an elevated concentration of bacteria occurs. This is done in case the elevated bacteria concentrations persist.

Elevated bacteria counts most commonly occur in wet weather (SFWPS 2012). The causes of elevated counts are not always clear, but are likely related to storm runoff from the beaches themselves that might contain human and animal feces, decaying plant and animal material, and naturally occurring soil bacteria. Bacteria counts during dry weather are, with few exceptions, consistently low (SFWPS 2012). Elevated counts during dry weather often have no readily apparent cause; however, there is some indication that elevated counts might follow extreme high tide cycles.

3.2.1.5 Beneficial Uses

The *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan) identifies existing beneficial uses, limited beneficial uses, and potential beneficial uses for Bay Area water bodies. The Basin Plan identifies the following existing beneficial uses for the San Francisco Bay, Central Bay: ocean, commercial, and sport fishing; estuarine habitat; industrial service supply; industrial process

supply; fish migration; fish spawning; navigation; preservation of rare and endangered species; water contact recreation; non-contact water recreation; shellfish harvesting; and wildlife habitat (RWQCB 2011). No “potential” beneficial uses or “limited” beneficial uses are identified for the Central Bay.

3.2.2 References

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San Francisco Bay Regional Water Quality Control Board (RWQCB)

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The Bay Institute

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United States Geological Survey (USGS)

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3.3 AIR QUALITY

This section discusses the regulatory framework for air quality management and the existing air quality conditions in the area of the proposed 34th America's Cup (AC34) project.

3.3.1 Climate and Meteorology

The project area is located within the San Francisco Bay Area Air Basin. The air basin's moderate climate steers storm tracks away from the region for much of the year, although storms do affect the region from November through April. San Francisco's proximity to the onshore breezes stimulated by the Pacific Ocean provide for generally very good air quality. These winds are the result of the geographic features that form the San Francisco Bay and in particular the Golden Gate entrance to the west of the project area.

Temperatures in the project area average in the mid-50s annually, generally ranging from the low 40s on winter mornings to mid-70s during summer afternoons. Daily and seasonal oscillations of temperature are small because of the moderating effects of the nearby Bay. In contrast to the steady temperature regime, rainfall is highly variable and confined almost exclusively to the "rainy" period from November through April. Precipitation may vary widely from year to year as a shift in the annual storm track of a few hundred miles can mean the difference between a very wet year and drought conditions.

Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants regionally. The project area lies within the Peninsula climatological subregion. Marine air traveling through the Golden Gate is a dominant weather factor affecting dispersal of air pollutants within the region. Wind measurements collected on the San Francisco mainland indicate a prevailing wind direction from the west and an average annual wind speed of 10.6 miles per hour (WRCC 2011). Increased temperatures create the conditions in which ozone formation can increase.

3.3.2 Ambient Air Quality

Table AIR-1 presents a summary of air quality monitoring results collected in San Francisco for the period 2005 to 2009 by the Bay Area Air Quality Management District (BAAQMD). Table AIR-2 lists the federal ambient air quality standards and current attainment status for each criteria air pollutant.

3.3.2.1 Ozone

Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving volatile organic compounds (VOC), (also sometimes referred to by some regulating agencies as reactive organic gases or ROG) and nitrogen oxides (NO_x). The main sources of VOC and NO_x, often referred to as ozone precursors, are combustion processes (including motor vehicle engines) and the evaporation of solvents, paints, and fuels. In the Bay Area, automobiles are the single largest source of ozone precursors. Ozone is referred to as a regional air pollutant

TABLE AIR-1: SUMMARY OF SAN FRANCISCO AIR QUALITY MONITORING DATA (2005–2009)

Pollutant	Applicable Federal Standard	Number of Days Standards Were Exceeded and Maximum Concentrations Measured ^a				
		2006	2007	2008	2009	2010
Ozone						
- Days 8-Hour Standard Exceeded		0	0	0	0	0
- Maximum 8-Hour Concentration (pphm)	>75 pphm ^b	5	5	7	6	5
Carbon Monoxide (CO)						
- Days 1-Hour Standard Exceeded		0	0	0	0	ND
- Maximum 1-Hour Concentration (ppm)	>35 ppm ^b	2.9	2.7	5.7	4.3	ND
- Days 8-Hour Standard Exceeded		0	0	0	0	0
- Maximum 8-Hour Concentration (ppm)	>9 ppm ^b	2.1	1.6	2.3	2.9	1.4
Suspended Particulates (PM₁₀)						
- Days 24-Hour Standard Exceeded ^a		0	0	0	0	0
- Maximum 24-Hour Concentration (µg/m ³)	>150 µg/m ³ ^b	58	66	41	35	39
Suspended Particulates (PM_{2.5})						
- Days 24-Hour Standard Exceeded ^d		3	5	0	1	3
- Maximum 24-Hour Concentration (µg/m ³)	>35 µg/m ³ ^b	54	45	29	36	45
- Annual Average (µg/m ³)	>15 µg/m ³ ^b	9.6	8.6	ND	ND	10.5
Nitrogen Dioxide (NO₂)						
- Days 1-Hour Standard Exceeded		0	0	0	0	0
- Maximum 1-Hour Concentration (pphm)	>10 pphm ^e	11 ^e	7	6	6	9
Sulfur Dioxide (SO₂)						
- Days 24-Hour Standard Exceeded		0	0	0	ND	ND
- Maximum 24-Hour Concentration (ppb)	>140 ppb ^b	6	6	4	ND	ND
Lead (Pb)						
- Standard Exceeded?		ND	No	ND	No	ND
- Rolling 3-Month Average (µg/m ³)	0.15 µg/m ³	ND	0.006	ND	0.005	ND
NOTES:						
<p>Bold values are in excess of applicable standard. "ND" indicates that data is not available. ppm = parts per million; pphm = parts per hundred million; ppb=parts per billion; µg/m³ = micrograms per cubic meter</p> <p>^a Number of days exceeded is for all days in a given year, except for particulate matter. PM₁₀ and PM_{2.5} are monitored every six days and therefore the number of days exceeded is out of approximately 60 annual samples.</p> <p>^b Federal standard, not to be exceeded.</p> <p>^d Federal standard was reduced from 65 µg/m³ to 35 µg/m³ in 2006.</p> <p>^e Federal primary standard was reduced from 25 to 10 pphm in 2010.</p>						
<p>SOURCE: BAAQMD, Bay Area Air Pollution Summary, 2006 – 2009. Available on the Internet at <http://www.baaqmd.gov/Divisions/Communications-and-Outreach/Air-Quality-in-the-Bay-Area/Air-Quality-Summaries.aspx>, <http://www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/start>, <http://www.arb.ca.gov/adam/topfour/topfour1.php>, and <http://www.arb.ca.gov/adam/toxics/sitepages/pbsfo.html>.</p>						

TABLE AIR-2: FEDERAL AMBIENT AIR QUALITY STANDARDS AND ATTAINMENT STATUS

Pollutant	Averaging Time	Federal (NAAQS ^a)	
		Standard	Attainment Status
Ozone	1 hour	NA	See Note b
	8 hour	0.075 ppm	N /Marginal
Carbon Monoxide (CO)	1 hour	35 ppm	A
	8 hour	9 ppm	A/Maintenance
Nitrogen Dioxide (NO ₂)	1 hour	0.100 ppm	U
	Annual	0.053 ppm	A
Sulfur Dioxide (SO ₂)	1 hour	0.075	A
	24 hour	0.14	A
	Annual	0.03 ppm	A
Particulate Matter (PM ₁₀)	24 hour	150 µg/m ³	U
Fine Particulate Matter (PM _{2.5})	24 hour	35 µg/m ³	N
	Annual	15 µg/m ³	A
Lead (Pb)	Rolling 3-month	0.15 µg/m ³	U

NOTES:
A = Attainment; N = Nonattainment; U = Unclassified; NA = Not Applicable, no applicable standard; ppm = parts per million; µg/m³ = micrograms per cubic meter.

^a NAAQS = national ambient air quality standards. NAAQS, other than ozone and particulates, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The 8-hour ozone standard is attained when the three-year average of the fourth highest daily concentration is 0.08 ppm or less. The 24-hour PM₁₀ standard is attained when the three-year average of the 99th percentile of monitored concentrations is less than the standard. The 24-hour PM_{2.5} standard is attained when the three-year average of the 98th percentile is less than the standard.

^b The United States Environmental Protection Agency (U.S. EPA) revoked the national 1-hour ozone standard on June 15, 2005.

^c National standard = annual arithmetic mean.

SOURCE: Bay Area Air Quality Management District (BAAQMD), Standards and Attainment Status, 2011, available on the Internet at <http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm>, viewed on November 18, 2011; and U.S. EPA National Ambient Air Quality Standards, 2011, available on the Internet at <<http://www.epa.gov/air/criteria.html>>, viewed on November 18, 2011.

because its precursors are transported and diffused by wind concurrently with ozone production through the photochemical reaction process. Ozone causes eye irritation, airway constriction, and shortness of breath and can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema. The nearest air quality monitoring station to the project area is located on Arkansas Street, approximately 1.5 miles southwest of Pier 32. Table AIR-1 shows that, according to published data, the most stringent applicable standard (parts and the federal 8-hour standard of 8 per hundred million [pphm]) was not exceeded in San Francisco between 2005 and 2009.

3.3.2.2 Carbon Monoxide (CO)

CO is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles; the highest emissions occur during low travel speeds, stop-and-go driving, cold starts, and hard acceleration. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause headaches, nausea, dizziness, and fatigue; impair central nervous system function; and induce angina (chest pain) in persons with serious

heart disease. Very high levels of CO can be fatal. As shown in Table AIR-1, the federal CO standards were not exceeded between 2005 and 2009. Measurements of CO indicate hourly maximums ranging between 8 to 16 percent of the federal standard, and maximum 8-hour CO levels that are approximately 30 percent of the allowable 8-hour standard.

3.3.2.3 Particulate Matter (PM10 and PM2.5)

Particulate matter is a class of air pollutants that consists of heterogeneous solid and liquid airborne particles from man-made and natural sources. Particulate matter is measured in two size ranges: PM10 for particles less than 10 microns in diameter, and PM2.5 for particles less than 2.5 microns in diameter. In the Bay Area, motor vehicles generate about one-half of the air basin's particulates, through tailpipe emissions as well as brake pad and tire wear. Wood burning in fireplaces and stoves, industrial facilities, and ground-disturbing activities such as construction are other sources of such fine particulates. These fine particulates are small enough to be inhaled into the deepest parts of the human lung and can cause adverse health effects. According to the California Air Resources Board (CARB), studies in the United States and elsewhere "have demonstrated a strong link between elevated particulate levels and premature deaths, hospital admissions, emergency room visits, and asthma attacks," and studies of children's health in California have demonstrated that particle pollution "may significantly reduce lung function growth in children."

The CARB also reports that statewide attainment of particulate matter standards could prevent thousands of premature deaths, lower hospital admissions for cardiovascular and respiratory disease and asthma-related emergency room visits, and avoid hundreds of thousands of episodes of respiratory illness in California (CARB 2011b). A large body of scientific evidence indicates that both long-term and short-term exposure to PM2.5 can cause a wide range of health effects (e.g., aggravating asthma and bronchitis, causing visits to the hospital for respiratory and cardiovascular symptoms, and contributing to heart attacks and deaths) (BAAQMD, 2011).

While monitoring data indicate that PM10 concentrations have varied from 23 to 44 percent of the federal standard over the past five years, Table AIR-1 shows that violations of the federal PM2.5 standard have routinely occurred in San Francisco. The federal 24-hour PM2.5 standard was not exceeded until 2006, when the standard was lowered from 65 $\mu\text{g}/\text{m}^3$ to 35 $\mu\text{g}/\text{m}^3$.

3.3.2.4 Nitrogen Dioxide (NO₂)

NO₂ is a reddish brown gas that is a byproduct of combustion processes. Automobiles and industrial operations are the main sources of NO₂. Aside from its contribution to ozone formation, NO₂ can increase the risk of acute and chronic respiratory disease and reduce visibility. NO₂ may be visible as a coloring component on high pollution days, especially in conjunction with high ozone levels. Table AIR-1 shows that the federal standard for NO₂ has not been exceeded for the past five years, although the highest monitored value in 2006 would have exceeded the revised federal standard adopted in 2010. Measurements of NO₂ indicate that 1-hour maximum concentrations ranged between 60 to 90 percent of the federal standard between 2007 and 2010.

In 2010, the U.S. Environmental Protection Agency (U.S. EPA) implemented a new 1-hour NO₂ standard presented in Table AIR-2. Currently, the CARB is recommending that the Bay Area air basin be designated as an attainment area for the new standard (CARB 2011a).

The U.S. EPA has also established requirements for a new monitoring network to measure NO₂ concentrations near major roadways in urban areas with a population of 500,000 or more. Sixteen new near-roadway monitoring sites will be required in California, three of which will be in the Bay Area. These monitors are required to be deployed by January 2013. The new monitoring data may result in a need to change area designations in the future. The CARB will revise the area designation recommendations, as appropriate, once the new monitoring data become available.

3.3.2.5 Sulfur Dioxide (SO₂)

SO₂ is a colorless acidic gas with a strong odor. It is produced by the combustion of sulfur-containing fuels such as oil, coal, and diesel. SO₂ has the potential to damage materials and can cause health effects at high concentrations. It can irritate lung tissue and increase the risk of acute and chronic respiratory disease (BAAQMD 2011). Table AIR-1 shows that the federal standard for SO₂ is being met in the Bay Area, and pollutant trends suggest that the air basin will continue to meet this standard for the foreseeable future. Measurements of SO₂ indicate that 24-hour maximum concentrations ranged between 3 to 4 percent of the federal standard over the past three years for which data are available.

In 2010, the U.S. EPA implemented a new 1-hour SO₂ standard presented in Table AIR-2. The U.S. EPA anticipates initially designating areas based on 2008-2010 monitoring data, or refined dispersion modeling results if provided by the state by June 2012. Similar to the new federal standard for NO₂, the U.S. EPA has established requirements for a new monitoring network to measure SO₂ concentrations to be operational by January 2013 (U.S. EPA 2010). The new monitoring data may result in a need to change area designations in the future.

3.3.3 Trends in Ozone Precursor and Particulate Matter Emissions

Emissions of VOC and NO_x have both been greatly reduced in recent decades. However, VOC emissions have been reduced much faster than NO_x. Since the early 1980s, VOC emissions have been reduced by about 75 percent, compared to about 50 percent for NO_x. This reflects the fact that in the 1970-2000 period state regulations focused on reducing emissions from light-duty vehicles; light-duty vehicles are a major source of VOC emissions, whereas heavy-duty vehicles are the primary source of NO_x emissions. Since diesel engines currently account for more than half (57 percent) of total NO_x emissions in the Bay Area, state regulations to reduce emissions of NO_x (and PM) from heavy-duty diesel engines will be very beneficial in reducing ozone levels emissions of VOC and NO_x in the Bay Area are projected to continue to decline in future years (BAAQMD 2010).

The Bay Area has seen significant reductions in PM₁₀ levels since 1990; peak concentrations have declined by approximately half and annual average values have declined by about one-third. PM_{2.5} has only been measured since 1999, so quantitative trend analysis is currently limited. However, it is likely that PM_{2.5} has been reduced at least as much as PM₁₀. Locally emitted wood smoke accounts for approximately one-third of PM_{2.5} levels on days when Bay Area PM levels exceed the national 24-hour

PM_{2.5} standard. Preliminary wood smoke simulations have suggested that the wood smoke rule may have been effective at reducing ambient wood smoke levels by 50 to 75 percent at key PM_{2.5} monitoring locations.

3.3.4 Federal Air Quality Regulations

The 1970 Clean Air Act (last amended in 1990) requires that regional planning and air pollution control agencies prepare a regional air quality plan to outline the measures by which both stationary and mobile sources of pollutants will be controlled in order to achieve all standards by the deadlines specified in the act. These ambient air quality standards are intended to protect the public health and welfare, and they specify the concentration of pollutants (with an adequate margin of safety) to which the public can be exposed without adverse health effects. They are designed to protect those segments of the public most susceptible to respiratory distress, including asthmatics, the very young, the elderly, people weak from other illness or disease, or persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollution levels that are somewhat above ambient air quality standards before adverse health effects are observed.

As required by the 1970 Clean Air Act, the U.S. EPA initially identified six criteria air pollutants that are pervasive in urban environments and for which state and federal health-based ambient air quality standards have been established. The U.S. EPA calls these pollutants criteria air pollutants because the agency has regulated them by developing specific public health- and welfare-based criteria as the basis for setting permissible levels. Ozone, CO, PM, NO₂, SO₂, and lead are the six criteria air pollutants originally identified by U.S. EPA. Since that time, subsets of particulate matter have been identified for which permissible levels have been established. These include PM₁₀ and PM_{2.5}.

The Clean Air Act established National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare from air pollution. Areas of the country that do not meet the NAAQS for any pollutant are designated by the EPA as “nonattainment areas.” Areas that were once designated nonattainment, but are now achieving the NAAQS are termed “maintenance areas.” Areas which have air pollution levels below the NAAQS are termed “attainment areas.” In nonattainment areas, states must develop plans to reduce emissions and bring the area back into attainment of the NAAQS. The General Conformity Rule, established by the Clean Air Act Amendments of 1990, ensures that the actions taken by federal agencies in nonattainment and maintenance areas do not interfere with a state’s plans to meet national standards for air quality.

3.3.5 Federal Policies

3.3.5.1 *Executive Order 13423*

Executive Order 13423, issued by President George W. Bush on January 24, 2007, sets as a policy of the United States that “Federal agencies conduct their environmental, transportation, and energy-related activities under the law in support of their respective missions in an environmentally, economically and fiscally sound, integrated, continuously improving, efficient, and sustainable manner” (Section 1,

Policy). Goals for agencies include such measures as: ensuring that agencies reduce their fleet's total consumption of petroleum products (U.S. EPA 2007).

3.3.5.2 2006 National Park Service Management Policies

The National Park Service has a responsibility to protect air quality under both the 1916 Organic Act and the Clean Air Act. Accordingly, the National Park Service will seek to perpetuate the best possible air quality in parks to (1) preserve natural resources and systems, (2) preserve cultural resources, and (3) sustain visitor enjoyment, human health, and scenic vistas. Vegetation, visibility, water quality, wildlife, historic and prehistoric structures and objects, cultural landscapes, and most other elements of a park environment are sensitive to air pollution and are referred to as "air quality-related values." The National Park Service will actively promote and pursue measures to protect these values from the adverse impacts of air pollution. In cases of doubt as to the impacts of existing or potential air pollution on park resources, the National Park Service will err on the side of protecting air quality and related values for future generations.

3.3.6 Local Air Quality Planning

The BAAQMD is the regional agency responsible for air quality regulation within the San Francisco Bay Area Air Basin. The BAAQMD regulates air quality through its planning and review activities and has permit authority over most types of stationary emission sources. The BAAQMD can require stationary sources to obtain permits, and can impose emission limits, set fuel or material specifications, or establish operational limits to reduce air emissions. The BAAQMD regulates new or expanding stationary sources of toxic air contaminants.

For state air quality planning purposes, the Bay Area is classified as a serious nonattainment area for ozone. The "serious" classification triggers various plan submittal requirements and transportation performance standards. One such requirement is that the BAAQMD updates the *Clean Air Plan* (CAP) every three years to reflect progress in meeting the air quality standards and to incorporate new information regarding the feasibility of control measures and new emission inventory data. The Bay Area's record of progress in implementing previous measures must also be reviewed. On September 15, 2010, the BAAQMD adopted the most recent revision to the CAP—the 2010 CAP. The goals of the 2010 CAP are to:

- Update the Bay Area 2005 Ozone Strategy in accordance with the requirements of the California Clean Air Act to implement "all feasible measures" to reduce ozone;
- Consider the impacts of ozone control measures on PM₁₀ and PM_{2.5}, TACs, and greenhouse gases (GHGs) in a single, integrated plan;
- Review progress in improving air quality in recent years; and
- Establish emission control measures to be adopted or implemented in the 2009–2012 timeframe.

3.3.7 Sensitive Receptors

Air quality does not affect every individual in the population in the same way, and some groups are more sensitive to adverse health effects than others. Population subgroups sensitive to the health effects of air pollutants include the elderly and the young; population subgroups with higher rates of respiratory disease, such as asthma and chronic obstructive pulmonary disease; and populations with other environmental or occupational health exposures (e.g., indoor air quality) that affect cardiovascular or respiratory diseases. Land uses and facilities such as schools, children's day care centers, hospitals, and nursing and convalescent homes are considered to be more sensitive than the general public to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress. Parks and playgrounds are considered moderately sensitive to poor air quality because persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality; however, exposure times are generally far shorter in parks and playgrounds than in residential locations and schools, and these shorter exposure times typically reduce overall exposure to pollutants. Residential areas are considered more sensitive to air quality conditions compared to commercial and industrial areas because people generally spend longer periods of time at their residences, with associated greater exposure to ambient air quality conditions. Sensitive receptors may be defined as children, adults, and seniors occupying or residing in residential dwellings, schools, colleges and universities, day care, hospitals, and senior-care facilities. Workers are not considered sensitive receptors because all employers must follow regulations set forth by the Occupation Safety and Health Administration (OSHA) to ensure the health and well-being of their employees.

The closest sensitive receptors to each project site are inventoried in **Table AIR-3**. As shown in **Table AIR-3**, sensitive receptors include residential uses east of The Embarcadero, between Townsend and Harrison streets, and between Washington and Bay streets. Residential uses are also concentrated south and west of Fort Mason and south of Marina Green.

TABLE AIR-3: SENSITIVE (HUMAN POPULATED) RECEPTORS IN THE PROJECT AREA

Project Site	Receptor Type and Location	Distance from Project Area
Aquatic Park	Residential: upper-level apartments at 2765 Hyde Street	200 feet
Alcatraz Island	None	
Crissy Field	Residential: Lendrum Court	1,000 feet
Cavallo Point	Hotel: Cavallo Point Lodge	600 feet
Fort Mason	Residential: Laguna Street between North Point and Bay streets	100 feet
SOURCE: ESA, 2011.		

3.3.8 References

Bay Area Air Quality Management District (BAAQMD)

- 2010 Bay Area 2010 Clean Air Plan, adopted September 2010.
- 2011 *BAAQMD CEQA Guidelines, California Environmental Quality Act Air Quality Guidelines*, May 2011, p. 5.2, Available on the Internet at <<http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines%20May%202011.ashx>>. Viewed on December 2, 2011.

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- 2010 Fact Sheet: Revisions to the Primary National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide, 2010. Available on the Internet at <<http://www.epa.gov/air/sulfurdioxide/pdfs/20100602fs.pdf>>.
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3.4 GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

This section describes greenhouse gases and their relationship to global climate change, as well as federal, state, and local regulations that address greenhouse gas emissions.

3.4.1 Greenhouse Gases

Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs) because, like a greenhouse, they capture heat radiated from the earth. The accumulation of GHGs has been implicated as a driving force in global climate change. Definitions of climate change vary between and across regulatory authorities and the scientific community. In general, however, climate change can be described as the changing of the earth's climate caused by natural fluctuations and anthropogenic activities (i.e., activities relating to, or resulting from the influence of, human beings) that alter the composition of the global atmosphere.

Increases in GHG concentrations in the earth's atmosphere are thought to be the main cause of human-induced climate change. GHGs naturally trap heat by impeding the exit of solar radiation that has hit the earth and is reflected back into space. This trapping of heat is called a "greenhouse effect." Some GHGs occur naturally and are necessary for keeping the earth's surface habitable. However, increases in the concentrations of these gases in the atmosphere during the last 100 years have decreased the amount of solar radiation that is reflected back into space, intensifying the natural greenhouse effect and resulting in the increase of global average temperature.

The principal GHGs of concern are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). Each of the principal GHGs has a long atmospheric lifetime (one year to several thousand years). In addition, the potential heat-trapping ability of each of these gases varies significantly. CH₄ is 23 times as potent as CO₂, while SF₆ is 22,200 times more potent than CO₂. Conventionally, GHGs have been reported as CO₂ equivalents (CO₂e). CO₂e takes into account the relative potency of non-CO₂ GHGs and converts their quantities to an equivalent amount of CO₂ so that all emissions can be reported as a single quantity.

The primary human-made processes that release GHGs include combustion of fossil fuels for transportation, heating, and electricity generation; agricultural practices that release CH₄ such as livestock grazing and crop residue decomposition; and industrial processes that release smaller amounts of high global warming potential gases such as SF₆, PFCs, and HFCs. Deforestation and land cover conversion have also been identified as contributing to global warming by reducing the earth's capacity to remove CO₂ from the air and altering the earth's albedo or surface reflectance, allowing more solar radiation to be absorbed.

3.4.2 Climate Trends and Associated Impacts

3.4.2.1 Global Issues

Global warming is the term used to describe the increase in the average temperature of the earth's near-surface air and oceans since the mid-20th century and its projected continuation. Warming of the climate system is now considered to be unequivocal (International Panel on Climate Change [IPCC] 2007), with global surface temperature increasing approximately 1.33 degrees Fahrenheit (°F) over the last 100 years. Continued warming is projected to increase global average temperature between 2 and 11 °F over the next 100 years.

The causes of this warming have been identified as both natural processes and human actions. The IPCC concludes that variations in natural phenomena such as solar radiation and volcanoes produced most of the warming from pre-industrial times to 1950 and had a small cooling effect afterward. However, after 1950, increasing GHG concentrations resulting from human activity such as fossil fuel combustion and deforestation have been responsible for most of the observed temperature increase. These basic conclusions have been endorsed by more than 45 scientific societies and academies of science, including all of the national academies of science of the major industrialized countries. Since 2007, no scientific body of national or international standing has maintained a dissenting opinion (IPCC 2007).

3.4.2.2 National Issues

Like global mean temperatures, U.S. temperatures also warmed during the 20th century and into the 21st century. According to data compiled by the National Oceanic and Atmospheric Administration (NOAA), average annual temperatures for the contiguous United States (or lower 48 states) are now approximately 1.25°F warmer than at the start of the 20th century, with an increased rate of warming over the past 30 years (U.S. EPA 2009). The rate of warming for the entire period of record (1901–2008) is 0.13°F per decade, while the rate of warming increased to 0.58°F per decade for the period 1979–2008. The last 10 five-year periods (, were the warmest five-year periods (i.e., pentads) in the period of record (since 1901), demonstrating the anomalous warmth of the last 50 years (U.S. EPA, 2009).

3.4.2.3 Statewide Issues

Maximum (daytime) and minimum (nighttime) temperatures are increasing almost everywhere in California but at different rates. During the period from 1920 to 2003, the annual minimum temperature averaged over all of California increased by 0.33 °F per decade, while the average annual maximum temperature increased by 0.1 °F per decade (Moser et al. 2009).

Global warming creates concerns about California's water resources. The most significant impacts of global warming on these resources have been changes to the water cycle and sea level rise. Over the past century, the precipitation mix between snow and rain has shifted in favor of more rainfall and less snow (Mote et al. 2005; Knowles and Cayan 2006), and snow pack in the Sierra Nevada is melting earlier in the spring (Kapnick and Hall 2009). The average early spring snowpack in the Sierra Nevada

has decreased by about 10 percent during the last century, a loss of 1.5 million acre-feet of snowpack storage (DWR 2008). These changes have significant implications for water supply, flooding, aquatic ecosystems, energy generation, and recreation throughout the state. During the same period, sea levels along California's coast rose 7 inches (DWR 2008). Sea level rise associated with global warming will continue to threaten coastal lands and infrastructure, increase flooding at the mouths of rivers, place additional stress on levees in the Sacramento-San Joaquin Delta, and intensify the difficulty of managing the Sacramento-San Joaquin Delta as the heart of the state's water supply system.

3.4.3 Sources of Greenhouse Gas Emissions

3.4.3.1 Statewide GHG Emissions

The California Air Resources Board (CARB) estimated that, in 2008, California produced about 478 million gross metric tons (MMT CO_2E ; about 525 million U.S. tons) of CO_2e .¹ The CARB found that transportation is the largest source, at 37 percent of the state's GHG emissions, followed by electricity generation (both in-state and out-of-state) at 24 percent and industrial sources at 19 percent. Commercial and residential fuel use (primarily for heating) accounted for 9 percent of GHG emissions (CARB 2011).

3.4.3.2 Regionwide GHG Emissions

In the Bay Area, fossil fuel consumption in the transportation sector (on-road motor vehicles, off-highway mobile sources, and aircraft) and the industrial/ commercial sector were the two largest sources of GHG emissions, each accounting for about 36 percent of the Bay Area's 95.8 MMT CO_2e (105.4 million U.S. tons) emissions in 2007. Industrial and commercial electricity and fossil fuel consumption (including office and retail) were the second largest contributors of GHG emissions, with about 34 percent of total emissions. Electricity generation accounted for approximately 16 percent of the Bay Area's GHG emissions, followed by residential fuel usage (e.g., home water heaters, furnaces) at 7 percent, off-road equipment at 3 percent, and agriculture at 12 percent. Among industrial sources, oil refining currently accounted for more than 40 percent of GHG emissions, or approximately 15 percent of the total Bay Area GHG emissions (BAAQMD 2008).

3.4.3.3 NPS Emissions Inventory for GGNRA

The emissions inventory for the Golden Gate National Recreation Area (GGNRA), which includes Fort Mason, Alcatraz, and portions of Crissy Field, quantifies GHG emissions from energy requirements for park operations (365 metric tons per year), mobile emissions from park visitors and employees (9,613 metric tons per year), and emissions from solid waste disposal and wastewater treatment (365 metric tons per year). Total GGNRA emissions inventoried for 2006 were 10,319 365 metric tons per year (NPS 2008)

¹ The abbreviation for "million metric tons" is MMT; thus, million metric tons of CO_2 equivalents is written as MMT CO_2E .

3.4.3.4 Project-Level GHG Emissions

Individual land development projects contribute to the cumulative effects of climate change by emitting GHGs during all phases, including demolition, construction, and operation.

3.4.4 References

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3.5 BIOLOGICAL RESOURCES

This section describes upland and marine biological resources in the vicinity of the proposed 34th America's Cup (AC34) project that could be affected by the various events or structural components associated with the project. This section is divided into two major subsections: 3.5.1, Upland Biological Resources, and 3.5.2, Marine Biological Resources.

3.5.1 Upland Biological Resources

The discussion of upland biological resources is organized into three subsections: (1) Vegetation Types, Associated Wildlife, Sensitive Natural Communities, and Wetlands; (2) AC34 Spectator Venues and Secondary Viewing Areas, and Baker Beach and Dunes – Vegetation and Wildlife; and (3) Special-Status Species/Species of Special Concern.

The project study area (or “project area”) is defined by where species and habitats analyzed in this environmental assessment may be exposed to direct or indirect impacts and includes areas potentially affected, directly or indirectly, by the various project components. The outer boundary of the project area includes the spectators on land or water who may find other locations (i.e., other than designated AC34 venue and secondary viewing areas) to observe the race; or regular visitors who, because of crowds in the designated venues, are simply displaced. Accordingly, the project area includes the Presidio waterfront north of Marina Green, extending along the northern portion of the peninsula, including Presidio lands between Crissy Field and Baker Beach, north of Mason Street and west of Lincoln Boulevard. The project area includes all of the Central Bay waters from south of the Bay Bridge to west of the Golden Gate Bridge, including Alcatraz, to Sausalito and slightly west of the Golden Gate Bridge. For the spectator sites north of the Golden Gate Bridge, the project area includes the Marin Headlands from Fort Baker to Point Bonita and Bird Island, although no visitor impacts are expected inshore at Point Bonita and Bird Island. This wide area was studied to include potential spectator vessels and the various race course alignments being considered, to conservatively estimate all potential effects. **Figure BIO-1** displays the general locations of special-status resources in the project area.

The primary sources of information referenced in this section are:

- California Department of Fish and Game (CDFG) January 2011 “Special Animals” list.
- California Department of Fish and Game (CDFG) California Natural Diversity Database (CNDDDB) for 7.5-minute topographic quadrangle of *Point Bonita, San Francisco North*, and *Oakland West*, Commercial Version, March 2011.
- California Native Plant Society (CNPS), Electronic Inventory for 7.5-minute topographic quadrangles: *Point Bonita, San Francisco North*, and *Oakland West*, March 2011.
- United States Fish and Wildlife Service (USFWS), Federally Endangered and Threatened Species List for 7.5-minute topographic quadrangle of *Point Bonita, San Francisco North*, and *Oakland West*, Document Number 110304051519, Commercial Version, March 2011.



SOURCE: Google Maps; ESA; CNDDB, 2001

AC34 / Environmental Assessment (210317)
Figure BIO-1
General Locations of Species of Concern
and Sensitive Habitat in the Project Area

Existing project area characteristics, such as habitat types and plant and animal species present, are described based on site-specific information developed for the project and published relevant information, especially environmental impact studies prepared for other NPS projects, NPS information sources, and technical articles and agency reports as indicated in source citations.

This description of the affected environment comprises vegetation types and composition across the project area, identifying and describing as necessary general vegetation types, associated wildlife including waterbirds, and the upland biological resources specific to AC34 primary and secondary viewing areas, and Baker Beach and dunes, expected to be an area to which non-race visitors at the other park locations might be displaced. As used in this EA, “upland” is a term that includes nonmarine plants and animals and seabirds. Marine biological resources, including marine mammals, are discussed below in Section 3.5.2.

The project area is in the Bay-Delta Bioregion, as defined by the state’s Natural Communities Conservation Program. This bioregion consists of natural communities ranging from the open waters of the Bay and Delta to salt and brackish marshes to chaparral and oak woodlands. The temperate climate is Mediterranean in nature, with relatively mild, wet winters and warm, dry summers. The high diversity of vegetation and wildlife found in the region is a result of soils, topographic, and microclimate diversity that also promotes species that are characterized as endemic to this region. This diversity and uniqueness in combination with the rapid pace of development in the region has resulted in endangerment for some local flora and fauna.

The San Francisco Bay-Delta is the second largest estuary in the United States and supports numerous aquatic habitats and biological communities. It encompasses 479 square miles, including shallow mudflats. San Francisco Bay is divided into four main basins: South Bay, Central Bay, San Pablo or North Bay, and Suisun Bay. This assessment focuses on the Central Bay, between the San Francisco-Oakland Bay Bridge (Bay Bridge) and the Richmond-San Rafael Bridge and connects to the Pacific Ocean through the Golden Gate. The regional setting for this evaluation includes the shallow water habitats around San Francisco Bay – the “baylands” (Goals Project 1999). The Central Bay subregion of the baylands includes the main body of San Francisco Bay. Its major streams, all relatively small, include Codornices, Corte Madera, Temescal, and Wildcat creeks. Lands within this subregion are in Alameda, Contra Costa, Marin, San Francisco, and San Mateo counties. Together, there are about 33,000 acres of baylands in the Central Bay subregion.

Lastly, the regional setting comprises the waters of the Bay itself, its islands, and the coastal beaches and bluffs north and south of the Golden Gate.

3.5.1.1 Vegetation Types, Associated Wildlife, Sensitive Natural Communities, and Wetlands

Plant Communities

Excluding the Marin Headlands, described below as a secondary viewing area, many of the plant communities in the project area are remnant populations of native communities that were once extensive along the coast of California. Using the Holland (1986) classification system, eight plant

communities, seven of which are native, were identified in the area where most of the direct impacts are likely to occur, excluding Alcatraz. **Figure BIO-2** displays vegetation south of the Golden Gate Bridge. Details of vegetation north of the bridge, which conforms to these types, are mapped in the subsection titled “Golden Gate National Recreation Area, Southern Marin County,” below.

The seven native plant communities include:

- Riparian scrub (central coast arroyo willow scrub and California blackberry);
- Mixed serpentine chaparral;
- Native grassland;
- Northern coastal scrub (including coastal scrub on sandy soils and on sandy soils with serpentinite inclusions);
- Northern coastal bluff scrub;
- Northern foredune; and
- Coastal salt marsh and associated communities.

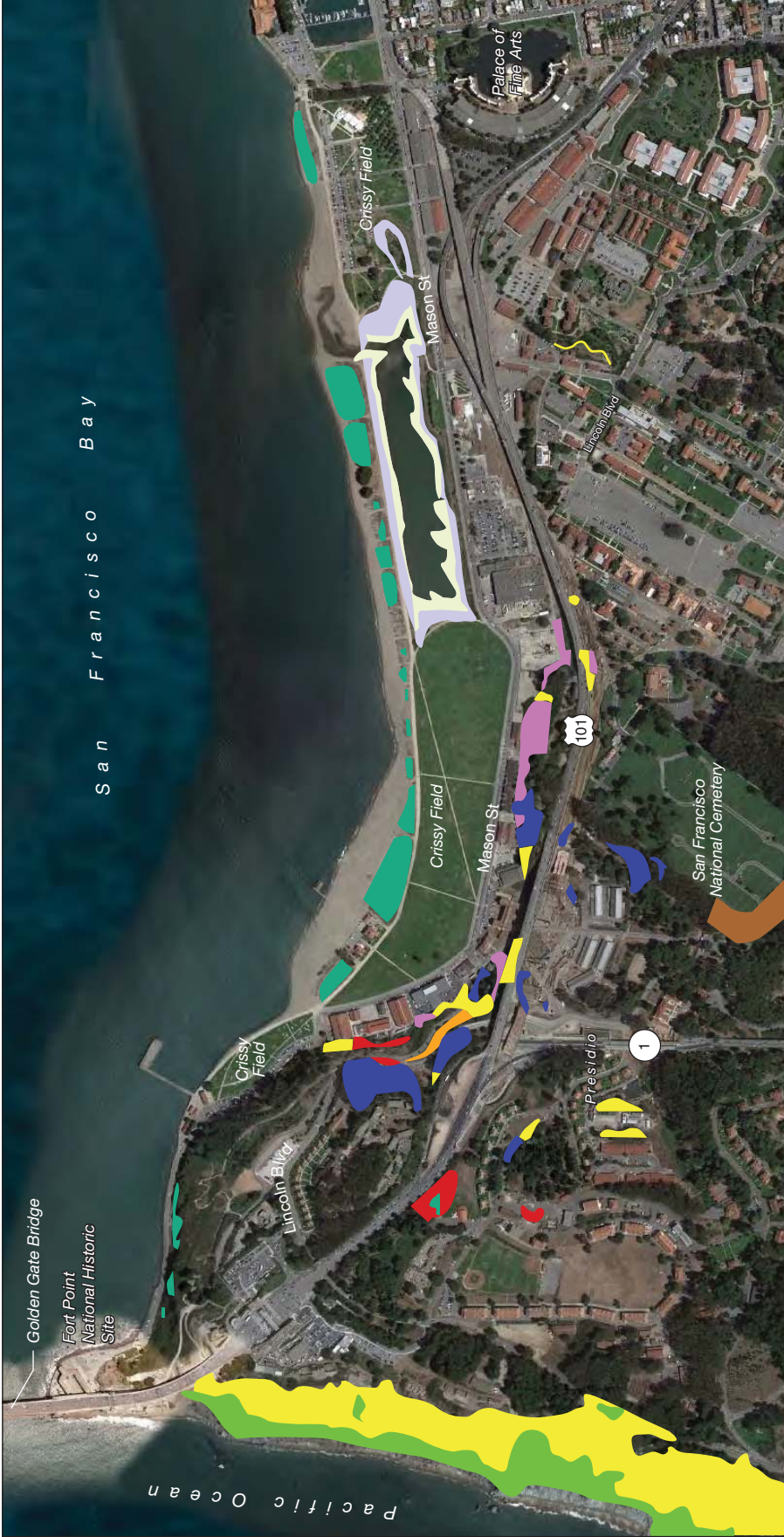
Riparian Scrub (including Central Coast Arroyo Willow Scrub and California Blackberry).

Arroyo willow (*Salix lasiolepis*) is the primary species in riparian scrub. A few blue elderberry (*Sambucus mexicana*) and red elderberry (*S. racemosa*) are present in central coast arroyo willow scrub. California blackberry (*Rubus ursinus*) intermixes with arroyo willow in one area of the Presidio, along the steep hillside slopes north of Doyle Drive and south of Mason Street (Federal Highway Administration 2008). These are technically a series of small wetlands protected by the NPS. As habitat, the NPS considers riparian scrub an important plant community; little of this community remains in the Presidio.

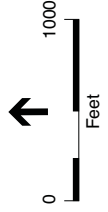
Mixed Serpentine Chaparral. This community occurs on shallow serpentine soils, which are unique geological soils naturally deficient in certain plant nutrients; only plants specially adapted to or tolerant of these chemically unique soils tend to grow and persist. The NPS and the Presidio Trust consider mixed serpentine chaparral an important plant community because it is limited within the area and it frequently supports several special-status plant species. In the project area, mixed serpentine chaparral is made up of primarily coyote brush (*Baccharis pilularis*), toyon (*Heteromeles arbutifolia*), and blue blossom ceanothus (*Ceanothus thyrsiflorus*), and serpentine endemics.

Native Grassland. This grassland type, occurring on chemically unique serpentinite soils, is primarily composed of purple needlegrass (*Nassella pulchra*), California oatgrass (*Danthonia californica*), and foothill needlegrass (*Nassella lepida*).

Northern Coastal Scrub. Northern coastal scrub occurs on sandy soil as well as sandy soil with serpentine inclusions. Soils with serpentinite inclusions are soils with small, localized spots containing chemically unique serpentine soils. Dominant species of northern coastal scrub that were observed in the project area included coyote brush, California sagebrush (*Artemisia californica*), and buckwheat (*Eriogonum fasciculatum foliolosum*). Northern coastal scrub in the project area is an open community



- Coastal Salt Marsh
- Coastal Dune Scrub
- Northern Foredune
- Northern Coastal Scrub
- Mixed Serpentine Chapparral
- Coast Live Oak Woodland
- Central Coast Arroyo Willow Scrub
- Native Grassland
- Understory Coastal Scrub
- Northern Coastal Bluff Scrub



SOURCE: ESA

Case No. 2010.0498E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)
Figure BIO-2
 Native Vegetation

with sparsely distributed plants. Understory scrub in the project area is primarily composed of non-native species, including English ivy and non-native annual grasses. Northern coastal scrub is a common plant community in northern California and is not typically considered sensitive by the California Department of Fish and Game (CDFG) or by the NPS.

Northern Coastal Bluff Scrub. The dominant species within this community are similar to those in northern coastal scrub. The main difference between these two communities is that northern coastal bluff scrub occurs on steeper slopes and is exposed to harsher environmental conditions (e.g., salt spray, wind, and sun exposure) than northern coastal scrub.

Northern Foredune. This community is subject to harsh environmental conditions resulting in an open community with sparsely distributed low-growing herbs and subshrubs. Dominant species in this community include sand-verbena (*Abronia spp.*), beach primrose (*Camissonia cheiranthifolia*), silvery beachweed (*Ambrosia chamissonis*), and coastal sage (*Artemisia pycnocephala*).

Coastal Salt Marsh. The dominant salt marsh species include Pacific cordgrass (*Spartina foliosa*), pickleweed (*Salicornia sp.*), salt grass (*Distichlis spicata*), alkali heath (*Frankenia salina*), sand-spurrey (*Spergularia sp.*), and fleshy jaumea (*Jaumea carnosa*).

Wildlife

Wildlife in Coastal Scrub, Coastal Bluff Scrub, and Riparian Scrub. Various species of butterflies inhabit the coastal scrub habitat; as well as a wide variety of small mammals, including pocket gophers (*Thomomys spp.*), deer mice (*Peromyscus maniculatus*), raccoons (*Procyon lotor*), and striped skunks (*Mephitis mephitis*). Coastal scrub provides habitat for reptiles that burrow or use underground den sites, such as western fence lizards (*Sceloporus occidentalis*), red-sided garter snakes (*Thamnophis sirtalis*), and alligator lizards (*Elgaria spp.*). Many bird species also use the coastal scrub habitats. From bird point count censuses in 1999 and 2000 (Point Reyes Bird Observatory 2002), the most abundant species in the coastal scrub habitat were the white-crowned sparrow (*Zonotrichia leucophrys*) and spotted towhee (*Pipilo maculatus*). Several other resident bird species forage, roost, nest, and/or breed in scrub habitat, including the house wren (*Troglodytes aedon*), western scrub jay (*Aphelocoma californica*), Steller's jay (*Cyanocitta stelleri*), California towhee (*Pipilo crissalis*), northern flicker (*Colaptes auratus*), mourning dove (*Zenaidura macroura*), Wilson's warbler (*Wilsonia pusilla*), and acorn woodpecker (*Melanerpes formicivorus*). Various sparrows and thrushes, wren (*Chamaea fasciata*), and other small ground- or shrub-nesting birds also use this community. Scrub habitat also attracts predators, such as Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), and other raptors.

Wildlife in Dune, Coastal Salt Marsh and Associated Communities. Common bird species that use the coastal dune and tidal zone include western gull (*Larus occidentalis*), Heermann's gull (*Larus heermanni*), ring-billed gull (*Larus delawarensis*), Caspian tern (*Hydroprogne caspia*), semipalmated plover (*Charadrius semipalmatus*), western sandpiper (*Calidris mauri*), dunlin (*C. alpina*), and least sandpiper (*C. minutilla*). The Caspian tern and the elegant tern (*Sterna elegans*) both roost on the park's beaches during the summer months (NPS 2008). Seabirds and diving ducks also use nearshore habitat along the outer coast of NPS lands and inside San Francisco Bay for foraging and resting. Common seabirds include several species of loons, grebes, and cormorants. In addition to the bird

species listed above, common mammal species also use the coastal marsh, including skunks and raccoons (Takekawa et al. 2003).

Wildlife Using the Waters of Central San Francisco Bay. Bird guilds that use the open waters of the Central Bay include the diving birds, feeding in deeper water on benthic invertebrates; dabblers, feeding in the upper water column of shallow subtidal areas; piscivores, feeding on fish; and opportunistic predators. Typical marine birds regularly inhabiting or using the project area include cormorants (*Phalacrocorax spp.*), pigeon guillemot (*Cepphus columba*), herring gull (*Larus argentatus*), mew gull (*L. canus*) and California brown pelican (*Pelecanus occidentalis californicus*). Among the diving benthivores guild, canvasback (*Aythya valisineria*), greater scaup (*A. marila*), lesser scaup (*A. affinis*), and surf scoter (*Melanitta perspicillata*) are common, as are western and Clark's grebes (*Aechmophorus occidentalis* and *A. clarkii*) and Pacific loons (*Gavia pacifica*).

Serpentine Communities

Generally, the NPS considers all native plant communities that are biologically intact and diverse as important natural communities (NPS 1999). In the project area, plant communities on serpentine substrates (i.e., mixed serpentine chaparral, and serpentine native grasslands), would be considered sensitive in this EA. Of the serpentine communities listed above, the grasslands would be considered the most sensitive to the effects of trampling, without brush to provide some degree of protection.

Other Communities Considered Sensitive

Other sensitive natural communities include those recently classified as "special-status natural communities" under the latest CDFG rare plant and natural community guidelines; central coast arroyo willow scrub, northern foredune, and coastal salt marsh developed as part of the Crissy Field restoration project, along with the Baker Beach area, which also supports coastal dune habitat. The Baker Beach dune scrub is especially important because of its rarity. It is one of the few remaining intact stands of this vegetation type in San Francisco.

Serpentine and other communities considered sensitive would be at risk primarily from the direct or indirect effects of trampling (see Chapter 4).

Wetlands

The only wetlands within the project area and potentially exposed to impacts from the project are in the vicinity of Crissy Marsh and the Doyle Drive corridor, and a few small seeps along the bluffs above Baker Beach. Crissy Marsh has been delineated as jurisdictional waters of the United States, and the NPS protects a series of small "Cowardin" wetlands within the Doyle Drive corridor. The Cowardin wetland definition includes wetlands, but also adds some habitats that, though lacking proper vegetation or soils, are still saturated or shallow inundated environments that support aquatic life. Such wetlands, which also qualify as waters of the state of California, are protected by the NPS. These wetlands are not, however, considered Waters of the United States as they are either swales, non-navigable tributaries, or seasonal wetlands (per *Rapanos v. United States* [126 S. Ct. 2208 (2006)]). As a result, they are not subject to the U.S. Army Corps of Engineers (Corps) jurisdiction under Section 404

of the Clean Water Act. The dominant species in these wetlands consist of arroyo willow and California blackberry, and the wetlands lie along the steep hillside slopes north of Doyle Drive and south of Mason Street (Federal Highway Administration 2008). These wetlands are densely vegetated and would not normally attract visitor interest. **Figure BIO-3** shows the locations of these wetlands (with the exception of the small seeps at Baker Beach).

3.5.1.2 AC34 Spectator Venues, Secondary Viewing Areas, and Baker Beach and Dunes – Vegetation and Special-Status Wildlife Present

This portion of the “Affected Environment” discussion is organized by impact sites (areas where impacts would occur, or the project “footprint”) and then goes on to discuss special-status species more comprehensively.

Crissy Field and Marsh

Crissy Field is the former Presidio Army Base Airfield, with reintroduced native turf grasses such as *Deschampsia* and *Nasella*, and ornamental landscaping. Twenty-two acres were converted into a tidal marsh (Crissy Marsh), which supports salt marsh species such as Pacific cordgrass (*Spartina foliosa*), pickleweed (*Salicornia sp.*), salt grass (*Distichlis spicata*), alkali heath (*Frankenia salina*), san-spurrey (*Spergularia sp.*), fleshy jaumea (*Jaumea carnosa*), and marsh rosemary (*Limonium californicum*). Northern foredune, central dune scrub and wetland communities are also present. The NPS considers natural communities in the Crissy Marsh important and has fenced the restored marsh and provides visitor access through a gate and along a boardwalk only.

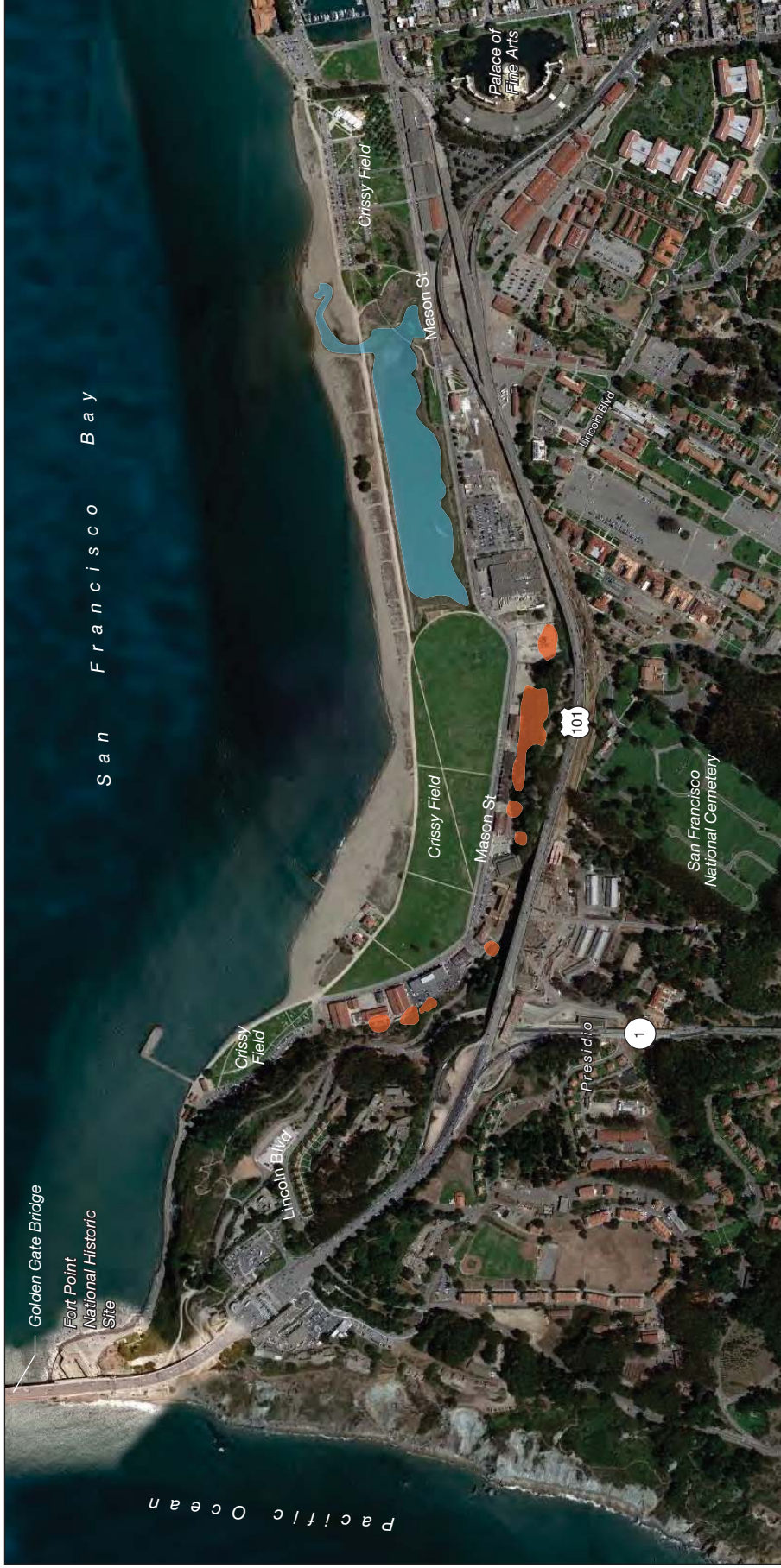
The marsh provides habitat for a variety of waterfowl. In surveys performed for the Doyle Drive project (Environmental Science Associates 2011) the most common species observed were ring-billed and western gulls (*Larus spp.*), ruddy ducks (*Oxyura jamaicensis*), and western and least sandpipers (*Calidrus mauri* and *C. minutilla*). Double-crested cormorants (*Phalacrocorax auritus*), greater scaup, and eared grebes (*Podiceps nigricollis*) commonly foraged in the open water. Western snowy plover (*Charadrius alexandrinus nivosus*), federally listed as threatened, are present between July and May at the Crissy Beach Wildlife Protection Area (WPA).

Fort Baker, Marin County

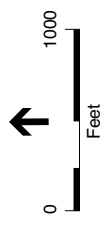
The Fort Baker Plan Environmental Impact Statement (EIS) (National Park Service 1999) described the vegetation of the area of Cavallo Point in Fort Baker as “Urban/Disturbed” as a result of historic use and landscape plantings. However, the nearby Battery Cavallo supports a population of lupine (*Lupinus albifrons*), a host plant of the federally listed endangered Mission blue butterfly (*Icaricia icariodes missionensis*), and there is now considerable butterfly habitat at Fort Baker owing to NPS

restoration projects. *Lupinus albifrons* occurs in many locations on the site, in addition to Battery Cavallo, particularly in the grassland areas. These areas include potential viewing areas at Battery Yates and off Drown Fire Road.

The shoreline and waters of Horseshoe Bay support a great variety of birds.



- National Park Service Cowardin Wetlands
- U.S. Corps of Engineers Wetland



SOURCE: Google Maps; ESA, 2011

Case No. 2010.0498E: AC34 / Cruise Terminal and Northeast Wharf Plaza (210317)

Figure BIO-3
Wetlands in the Crissy Field Area

Baker Beach and Dunes

For wildlife using this area, see the discussion of “Wildlife in Dune, Coastal Salt Marsh, and Associated Communities,” above. In addition, brown pelicans and cormorants use the rocks offshore. Baker Beach and dunes support three listed plant species. The rare serpentine soils on the coastal bluffs adjacent to Baker Beach and the native dune scrub community along Baker Beach provide important and unique habitat. The Baker Beach dune scrub is one of the few remaining intact stands of this vegetation type in San Francisco. Dune scrub is found on the sand terrace slopes above Baker Beach and the listed San Francisco lessingia (*Lessingia germanorum*) is found in association with this community. The dunes around Baker Beach have been seeded with San Francisco dune gilia (*Gilia capitata ssp. chamissonis*) and San Francisco Bay spineflower (*Chorizanthe cuspidata*), both species are included on California Native Plant Society (CNPS) List 1B (“Plants Rare, Threatened, or Endangered in California and Elsewhere”).

Both Fort Funston and Baker Beach have been designated as San Francisco lessingia recovery and enhancement sites. Although Baker Beach is not within the primary venue or secondary viewing areas, this EA assumes that it could receive heavier than normal use during the race events because park visitors may be displaced from formally designated viewing areas.

Alcatraz Island

For the most part, vegetation on Alcatraz Island, formerly a relatively barren rock, comprises grasses that have colonized the island as windblown seed and plants that have naturalized from the gardens planted by prison guards. Two species of cormorants, the Brandt’s cormorant and the pelagic cormorant, breed on Alcatraz. Although neither species is considered special-status, Alcatraz is the only breeding colony site for these two species in San Francisco Bay (National Park Service 2011). Other nesters include black-crowned night heron (*Nycticorax nycticorax*), snowy egret (*Egretta thula*), black oystercatchers (*Haematopus bachmani*) and the pigeon guillemot (*Cephus columba*). For the latter four species, nesting colonies are listed as special-status on the CDFG “Special Animals” list. Western and California gulls (*Larus occidentalis* and *L. californicus*) also breed there.

Disturbance intolerance of some of the species has been reported in the literature, and this subject will be discussed in detail in Chapter 4. Black-crowned night herons, for example, are susceptible to human disturbance, especially just before or during egg-laying, causing nest abandonment and subsequent egg predation (Tremblay and Ellision, 1979). Human disturbance at dense breeding colonies is considered by some as a serious conservation concern. The adults flush from the nest when approached by humans, boats, low-flying aircraft, and dogs, resulting in increased predation by gulls and ravens and nest abandonment. Somewhat later in the season night herons may become acclimated to disturbance or may have sufficient parental investment in the nest to be less apparently responsive; nest abandonment is more likely to occur at the beginning of the breeding season, during territory settlement and egg laying, in accordance with theories of parental investment (Knight & Temple, 1986). This has been noted for this species by other researchers as well; as the heron nesting season progressed, Fernandez-Jurcic et al. (2007), in a controlled study, found a decrease in the proportion of in disturbance-associated behavior.

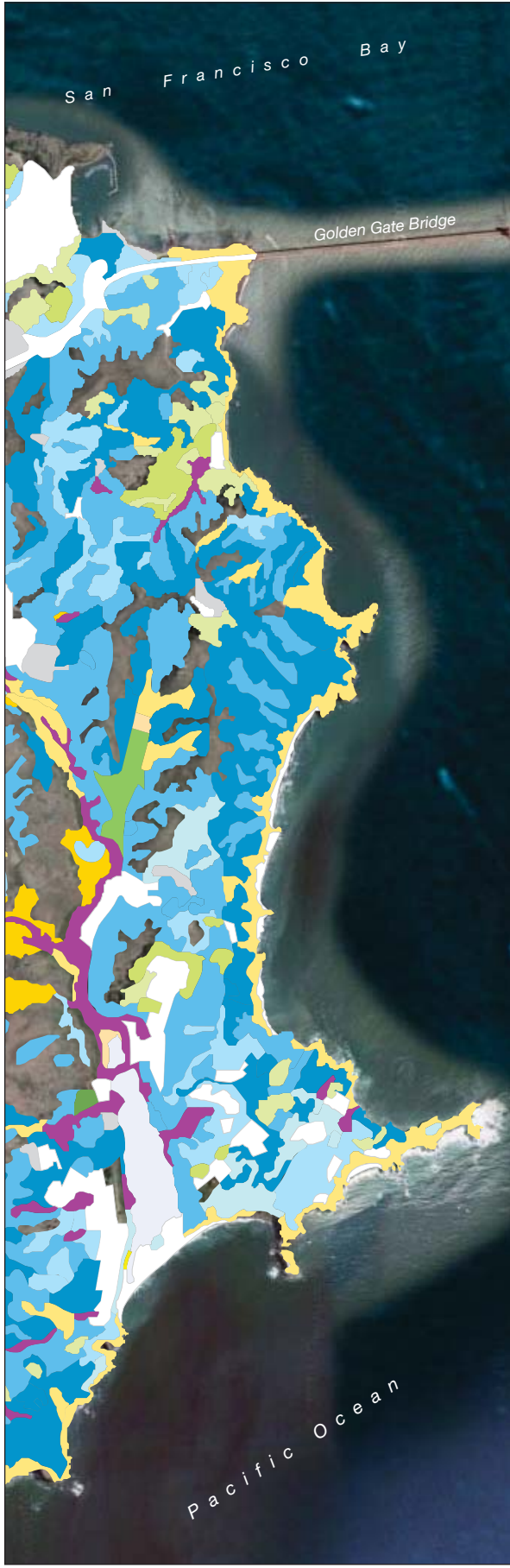
In a study in Gualala on the effects of fireworks, both pelagic and Brandt's cormorants quickly changed from resting to erect postures at the first fireworks, followed by birds moving about or departing from the island. During the study period, 90 Brandt's cormorant nests were documented on Gualala Point Island. Of these, seven nests (35 percent of nest failures) were abandoned in the days following the fireworks display, and another seven nests were abandoned several days later. In the same study, pelagic cormorants abandoned both of two monitored nests in the study area (Weigand, JF; and McChesney, G.J. 2008). Among the colonial nesting seabirds on Alcatraz, only snowy egrets have demonstrated some degree of disturbance tolerance (Schnitzius 1998.)

Population trends have been monitored for night herons and snowy egrets on Alcatraz by the USGS (2011). As part of a monitoring program initiated in 1990, the USGS documented nesting chronology, habitat use, subcolony use, and hatchability for the species. In 2010, the USGS monitored 196 night-heron nests, a 37% increase from the 143 nests found in 2009; 94 snowy egret nests, an increase from the 85 nests found in 2009. Black-crowned night-heron incubation-period success at Alcatraz Island in 2009 was 38%, nestling-period success was 76%, and overall reproductive success was 29%, all increases from 2009, but all lower than the 21-year averages. Incubation-period success (100%) and overall success (100%) for snowy egrets were higher than rates observed in the previous six years; nestling success (100%) was similar to previous years.

Golden Gate National Recreation Area, Southern Marin County

This area is assumed to include the Marin Headlands extending west to Bird Island. The bluffs above Conzelman Road are mostly on gabbro formation, an ultramafic soil type with chemical properties that support a distinct suite of native plants and wildlife species. In addition, this area is heavily influenced by coastal weather, with cool foggy summers, high winds, and fog drip that provides more or less year-round moisture to support vegetation. Coastal scrub and chaparral communities dominate the Marin Headlands, with some areas of serpentine coastal scrub and native grasslands. Vegetation in this area and the adjacent Fort Baker was mapped to display dominant species by the GGNRA and is presented as **Figure BIO-4**. The coastal scrub community supports coyote brush (*Baccharis pilularis*), California sagebrush (*Artemisia californica*), bush lupine (*Lupinus arboreus*), and poison oak (*Toxicodendron diversilobum*) (NPS 2011b). The NPS considers suitable – and presumed occupied – Mission blue butterfly habitat to extend west along the Marin Headlands south of Conzelman Road, and especially in the vicinity of Kirby Cove.

The wildlife is varied, and a particularly unique feature is Hawk Hill, a 920-foot elevation point in the midst of the largest known migratory flight corridor of diurnal raptors in the Pacific states. There are nesting seabirds along the cliffs of Marin Headlands. Peregrine falcons have nested just west of Kirby Cove the last several years. Common murre (*Uria aalge*) and Brandt's cormorants breed on Bird Island. Large aggregations of "rafting" birds (i.e., closely congregating on water), often western and Clark's grebes (*Aechmophorus occidentalis* and *A. clarkii*), are frequently observed in and adjacent to the waters of Bonita Cove.



Non-vegetated & Other
 Eucalyptus
 Monterey Pine- Monterey Cypress
 Arroyo, Red, Black, and Yellow Willow
 Chamise- Manzanita
 Coyotebrush- California Sagebrush

Mature Coyotebrush- Coffeeberry- Poison Oak
 Open Grassy Coyotebrush- Yellow Bush Lupine
 Dune Lupine- Dune Sagewort- Dunegrass
 Introduced Perennial Grassland- Deschampsia
 Pacific Reedgrass- Carex- Juncus
 Bullrush- Cattail

Pickleweed- Saltgrass
 Active Pasture or Agriculture
 Beaches or Mudflats
 Dunes
 Disturbed
 Built-up Urban disturbance
 Water



SOURCE: Google Maps

AC34 / Environmental Assessment (210317)

Figure BIO-4
Native Vegetation Marin Headlands Area

3.5.1.3 Special-Status Species/Species of Special Concern

Special-status species are plants and animals that are legally protected under the state and federal Endangered Species Acts (ESA) or other regulations, as well as species that are considered sufficiently rare by the scientific community to qualify for such status. The federal ESA was enacted to protect plant and animal species considered to be in danger of extinction and affords legal protection to species listed as endangered and threatened, including protection of their habitats. “Critical” habitat is defined in the federal ESA as a specific geographic area that contains habitat features essential for the conservation and recovery of a threatened or endangered species. The U.S. Fish and Wildlife Service (USFWS) of the Department of the Interior and the National Oceanic and Atmospheric Administration–Fisheries (NOAA Fisheries) of the Department of Commerce share responsibility for administration of the federal ESA. The California ESA is similar to the federal ESA, both in process and substance; it is intended to provide additional protection to threatened and endangered species in California. The California ESA does not supersede the federal ESA, but operates in conjunction with it. Additional federal regulations protect both listed and non-listed wildlife species in the project area, including the Fish and Wildlife Coordination Act of 1934 (as amended), the Bald and Golden Eagle Protection Act, the Marine Mammal Protection Act, and the Migratory Bird Treaty Act. These laws are described in greater detail in Chapter 4.

CNPS List 1B or List 2 plants (list 2 plants are deemed rare, threatened, or endangered in California, but more common elsewhere), are considered of Special Concern as well (For a definition CNPS terms, see Chapter 4 - Guiding Policies and Regulations – Vegetation)

Previous sections have dealt with both common and special-status resources as they appear within the project area. Special-status species most likely to be affected by the project are discussed in more detail below. Activities on and offshore associated with the America’s Cup event may affect these species by disturbance in nesting or foraging areas, or, for plants, by spectator traffic. Appendix F includes an annotated table of all special-status wildlife or plant species potentially present in the project area, as well as a brief summary of presence/absence of suitable habitat and distribution notes.

Non-Listed Wildlife and Plant Species of Special Concern

Wildlife. The following raptor species are protected by the California Fish and Game Code or are California Species of Special Concern, and breed in large trees or tree cavities in the Presidio’s historic forest (300 acres of planted eucalyptus, pine, and cypress within the Presidio) and at Fort Baker and Marin Headlands. These include barn owl (*Tyto alba*), western screech owl (*Megascops kennicottii*), white-tailed kite (*Elanus leucurus*), Cooper’s hawk (*Accipiter cooperii*), great horned owl (*Bubo virginianus*), sharp-shinned hawk (*Accipiter striatus*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). Peregrine falcon (*Falco peregrinus anatum*) forage near the Bay Bridge, Golden Gate Bridge and in the City of San Francisco, and have nested in recent years on a cliff by Kirby Cove in the Marin Headlands.

Black-crowned night-heron and snowy egret both feed on small fish, crustaceans, and large insects, in shallow water or along shores of wetlands or aquatic habitats. For the snowy egret, San Francisco Bay colonies nest at ground level on marsh grindelia (*Grindelia humilis*) and woody glasswort (*Salicornia*

pacifica), and more commonly on coyote bush. Night herons nest in the reeds or thicket, and occasionally, in trees. Nesting colonies on Alcatraz for both species are named resources on the California Special Animals List. Both species show dramatic variation in nesting abundances; however, recent trends (since 2005) suggest regional declines but local increases. (Pitkin and Wood 2011; USGS 2011).

The double-crested cormorant is a Species of Special Concern in California. A year-round resident along the entire coast of California, the species is fairly common (locally very common) along the coast and in estuaries and salt ponds. The species forages mainly on fish, crustaceans, and amphibians. It sometimes feeds cooperatively in flocks of up to 600, often with pelicans, and nests in colonies of a few to hundreds of pairs (Zeiner et al. 1990). There are breeding colonies on Yerba Buena Island, and the species forages throughout the project area. This species reproductive success has varied over the last 26 years. In 2009 and 2010, cormorants showed a sharp decline, but they appear to be recovering. The low number of nesting pairs in 2009 was likely due to a low anchovy population throughout the Central California coast region (Pitkin and Wood 2011).

Caspian Terns (*Sterna caspia*), whose nesting areas are listed as a resource on the CDFG's California Special Animals List, are common to very common along the California coast and at scattered locations inland, from April through early August. They nest in colonies on sandy estuarine shores, on levees in salt ponds, and on islands in alkali and freshwater lakes. Breeding adults often fly substantial distances to forage in lacustrine, riverine, and fresh and saline emergent wetland habitats. They occur at Pier 64 adjacent to the Mission Bay Bayfront Park. Caspian Terns have shown a decrease, especially in recent years (Pitkin and Wood 2011).

Alcatraz Nesting Birds. Nesting birds on Alcatraz are a mix of different species with different levels of protection. As a whole, the colonies and their constituent species are collectively considered a resource deserving treatment equivalent to "special status." Two species of cormorants, the Brandt's cormorant and the pelagic cormorant, breed on Alcatraz. Although neither species is considered special-status, Alcatraz is the only breeding colony site for these two species in San Francisco Bay (NPS 2011). Other nesters include black-crowned night heron (*Nycticorax nycticorax*), snowy egret (*Egretta thula*), and the pigeon guillemot (*Cepphus columba*).

Plants. Special-status plant species include Point Reyes bird's beak (*Cordylanthus maritimus*), Franciscan manzanita (*Arctostaphylos montana* ssp. *ravenii*), San Francisco Bay spineflower (*Chorizanthe cuspidata* var. *cuspidate*), Franciscan thistle (*Cirsium andrewsii*), blue coast gilia (*Gilia capitata* ssp. *chamissonis*), San Francisco gumplant (*Grindelia hirsutula* var. *maritima*), San Francisco campion (*Silene verecunda* ssp. *verecunda*), and San Francisco owl's clover (*Triphysaria floribunda*), rose rock cress (*Arabis blepharophylla*), round-headed Chinese houses (*Collinsia corymbosa*) and San Francisco wallflower (*Erysimum franciscanum*).

These are mostly CNPS List 1B or List 2 plants, associated with coastal scrub or coastal bluff scrub and known to occur on or near the Presidio at Baker Beach, Crissy Field, Fort Point, and some in the Marin Headlands, Point Reyes bird's beak is a marsh plant present at Crissy Marsh (NPS 2010). Franciscan thistle is recorded by the CNDDDB in the Marin Headlands as well.

Federally or State-Listed Species

A total of eight state or federally listed, recently delisted or fully protected species are being considered in this EA. Brief descriptions and discussion of occurrence in the project area are provided below. Where information is available on population trends for individual species, it is included. No candidate species are found in the project area.

Wildlife. Federally listed as endangered, the Mission blue butterfly (*Icaricia icariodes missionensis*) occurs in grassland and coastal scrub with its larval food plants (*Lupinus albifrons*, *L. variicolor* and *L. formosus*). This species is primarily known from San Mateo County, but occurs at Twin Peaks and at the north end of Golden Gate Bridge in Marin County. The species was collected in 1981 from Fort Baker, Marin County, and also at the northern terminus of the Golden Gate Bridge (CDFG 2011b). Outside of Fort Baker, the occupied habitat extends west along the Marin Headlands south of Conzelman Road, and especially in the vicinity of Kirby Cove.

The western snowy plover (*Charadrius alexandrinus nivosus*), a federally listed threatened species and a California Species of Special Concern, uses areas with wide, sandy, dune-backed beaches for roosting and foraging during the nonbreeding season. This species forages above and below the mean high waterline, typically gathering food from the surface of the sand, wrack line, or low foredune vegetation. Snowy plovers overwinter at Ocean Beach and at Crissy Field, from July through May. Plovers in San Francisco Bay have decreased from historic numbers but more recently show an increasing trend, possibly reflecting improved survey effort. Snowy plover reproductive success is low in the Bay and has decreased over the past four years (Pitkin and Wood 2011).

A state fully protected species, brown pelicans (*Pelecanus occidentalis californicus*) are found in estuarine, marine subtidal, and marine pelagic waters throughout coastal California (Zeiner et al. 1990). Important habitat for pelicans during the nonbreeding season includes roosting and resting areas, such as offshore rocks, islands, sandbars, breakwaters, and pilings. Suitable areas need to be free of disturbance. This species rests temporarily on the water or isolated rocks, but roosting requires a dry location near food and a buffer from predators and humans. The California brown pelican is a common post-breeding resident (May through November) of the open waters of central San Francisco Bay. Least terns (*Sterna antillarum browni*) usually arrive at breeding territory in Southern California around April, and continue arriving to northern California breeding territories through mid-May. The species is federally listed as threatened and a California fully protected species. Breeding colonies are located in Southern California along marine and estuarine shores, and in San Francisco Bay in abandoned salt ponds and at the former Alameda Naval Air Station in Alameda County. The species feeds in nearby shallow, estuarine waters. Terns may use the project area for foraging. Since 1984, the number of California least tern pairs in the Alameda colony has increased by 9.7 percent per year, but the colony size appears to have stabilized in the last decade (Pitkin and Wood 2011; see also USGS 2011).

Plants. Presidio clarkia (*Clarkia franciscana*) is federally and state-listed as endangered and is a slender, branched annual species with stems about 12 inches tall and with few, small, slender entire lance-shaped leaves. The sparse flowers have four wedge-shaped petals that are lavender to pink. The middle of the flower is lighter in color with a reddish-purple basal spot. Blooming time is from May to July. The “serpentine endemics,” which include Presidio Manzanita and Marin dwarf-flax in addition to Presidio

clarkia, all inhabit low-growing serpentine coastal scrub and rock outcrops and exist adjacent to coastal and bluff scrub communities, which lie along bluffs east and north of Baker Beach (NPS 2011b).

Presidio (Raven's) manzanita (*Arctostaphylos hookeri* ssp. *Ravenii*) is federally and state-listed as endangered and is a perennial, prostrate to low-growing, shrub. As part of restoration efforts to reintroduce this species at the Golden Gate National Recreation Area (GGNRA), the plant has been introduced west of Lincoln Boulevard, near Baker Beach, in suitable serpentine habitat.

Marin dwarf-flax (*Hesperolinon congestum*), sometimes referred to as Marin western flax, is federally and state-listed as threatened and is a small herbaceous annual of the flax family with slender threadlike stems. Marin dwarf-flax occurs in serpentine grassland soil outcrops above Baker Beach, near the one remaining natural Presidio manzanita location.

San Francisco lessingia (*Lessingia germanorum*) is federally and state-listed as endangered and is a low-growing, slender-stemmed annual herb of the sunflower family (*Asteraceae*). Populations of this species occur primarily in small, local remnants of dune scrub in the Presidio. Dune scrub is found on the sand terrace slopes above Baker Beach and in the Lobos Creek Dunes, and San Francisco lessingia is found in association with this community at Baker Beach. Both Fort Funston and Baker Beach have been designated as San Francisco lessingia recovery and enhancement sites.

California seablight (*Suaeda californica*) is a shrub that is native to California and is endemic (limited) to California alone. It is included in the CNPS Inventory of Rare and Endangered Plants on list 1B.1 ("rare, threatened, or endangered in CA and elsewhere") and listed by the federal government as Endangered. Its usual habitat is coastal salt marsh and wetland-riparian areas and it is extant at Crissy Marsh.

3.5.2 Marine Biological Resources

This description of the "Affected Environment" addresses basic marine habitat types and associated biological communities as they occur within those areas of Central San Francisco Bay region that encompass the project area, identifying as necessary the presence of any sensitive or protected species or critical or essential habitat for those species. Upland terrestrial resources are discussed above.

The project area is located in the Bay-Delta Bioregion, as defined by the state's Natural Communities Conservation Program. This bioregion consists of a variety of natural communities that range from the open waters of the Bay and Delta to salt and brackish marshes to chaparral and oak woodlands. The San Francisco Bay-Delta is the second largest estuary in the United States and supports numerous aquatic habitats and biological communities. It encompasses approximately 479 square miles, including shallow mudflats. San Francisco Bay is divided into four main basins or regions: South Bay, Central Bay, San Pablo or North Bay, and Suisun Bay. This assessment focuses on portions of the Central Bay where AC34 project activities would occur. For the purposes of this analysis, the Central Bay region is located between the Richmond-San Rafael Bridge to the north and the San Bruno Shoals to the south and connects to the Pacific Ocean through the Golden Gate. It includes the deepest areas of the Bay as well as the most natural and man-made hard bottom substrate (NOAA 2007). Beneath the Golden Gate the seafloor reaches depths of 361 feet with strong tidal currents running through the Golden Gate and throughout the Central Bay (NOAA 2007).

The regional marine setting for purposes of this evaluation includes both the above and below water aquatic habitats located within Central San Francisco Bay – the “baylands” (Goals Project 1999). This includes both the open water pelagic habitat of Central Bay itself, estimated at 85 to 103 square miles at the mean lower low water (MLLW) mark (Goals Project 1999), as well as the subtidal and intertidal habitats, including both natural and artificial substrates. Central Bay encompasses approximately 168 square miles of subtidal habitat and 8 square miles of intertidal habitat (Goals Project 1999). Geographically it includes the aquatic areas adjacent to the port and city of San Francisco, the GGNRA, the open waters of Central San Francisco Bay and Richardson Bay, and the shoreline areas of Treasure, Alcatraz, and Angel islands, the Marin Headlands, and the Tiburon Peninsula. The waters immediately adjacent to the GGNRA are listed as national marine protected areas (MPAs).

3.5.2.1 General Marine Habitat Types and Associated Biota

Because of its proximity to the Golden Gate and open ocean waters, Central Bay habitats and biota most closely resemble open coast plant, invertebrate, and vertebrate marine communities that slowly shift to estuarine communities and compositions that become established farther into the Bay-Delta estuary from the Golden Gate.

Open Water (Pelagic) Habitats and Biota

Because of its close proximity to the Pacific Ocean, the open water (pelagic zone) environment of the Central Bay is very similar to the open water coastal environment. Pelagic habitat is the predominant marine habitat in Central San Francisco Bay and includes the area between the water’s surface and the seafloor. The water column can be further subdivided into shallow-water/shoal and deepwater/channel areas (NOAA 2007). The AC34 race activities are proposed to occur on the surface waters within the deepwater/channels of the Central Bay with proposed docking/mooring occurring adjacent to existing Port wharfs in shallower water areas. No activities are proposed to occur in regions of the Bay characterized as shoals or mud flats. The pelagic water column habitat is predominantly inhabited by planktonic organisms that either float or swim in the water, fish, marine birds, and marine mammals.

Thirty-three species of fish have been documented in Central Bay pelagic waters from CDFG IEP monthly bottom trawl fish collections between 2005 and 2009 (IEP 2005-2009b). Of these 33 species, three account for 99 percent of the total number of fish regularly observed in both the deep and shallow water areas of the Central Bay. Northern anchovy (*Engraulis mordax*) is the overwhelming dominant species, accounting for up to 94% of those fish inhabiting the water column. Pacific herring (*Clupea pallasii*) and jacksmelt (*Atherinopsis californiensis*), are the second and third most common fish taxa in Central Bay waters, which together account for an additional 5% of the fish sampled on an average annual basis. The remaining 30 species collectively, including longfin smelt (*Spirinchus thaleichthys*) and Chinook salmon (*Oncorhynchus tshawytscha*) account for less than 1 percent of the fish species present annually.

An important but smaller component of pelagic community in the Bay are the sharks, of which 11 species are known to inhabit Bay-Estuary waters and 5 species, the leopard shark (*Triakis semifasciata*), brown smoothhound shark (*Mustelus henlei*), spiny dogfish shark (*Squalus acanthias*),

broadnose sevengill cowshark shark (*Notorynchus cepedianus*), and soupfin shark (*Galeorhinus zyopterus*), are the most common. The leopard, brown smoothhound, spiny dogfish, and sevengill sharks are year-round residents of Bay-Estuary waters, while the soupfin shark only enters the Bay to breed and birth and is present only during the spring and summer months of the year.

Eight species of marine mammals are reported to occur within Central Bay waters. The most common are the harbor seal (*Phoca vitulina*), California sea lion (*Zalophus californianus*), and harbor porpoise (*Phocoena phocoena*), which are all year-round inhabitants. Additionally, the humpback whale (*Megaptera novaengliae*), California gray whale (*Eschrichtius robustus*), stellar sea lion (*Eumetopias jubatus*), California sea otter (*Enhydra lutra*), and elephant seal (*Mirounga angustirostris*) are occasionally observed in the waters of western Central Bay. In general, the presence of marine mammals in San Francisco Bay is related to distribution and presence of prey species and foraging habitat. Additionally, harbor seals and sea lions use various intertidal substrates that are exposed at low to medium tide levels for resting and breeding (NOAA 2007). These include multiple locations along the San Francisco waterfront and harbor, the shorelines of the GGNRA, Alcatraz, Angel, Treasure, and Yerba Buena islands, the Marin Headlands and shorelines of Richardson Bay, and Belvedere and Tiburon peninsulas.

Intertidal and Subtidal Habitats

Intertidal Habitats. Intertidal habitats, or the regions of the Bay that lie between low and high tides, in the Central Bay include sandy beaches; natural and artificial rock (quarried riprap); concrete bulkheads; concrete, composite, and wood pier pilings; and mud flats. These intertidal habitats provide highly diverse and varied locations for marine flora and fauna. Proximity to the Golden Gate and Pacific Ocean has resulted in an intertidal zone inhabited by many coastal as well as estuarine species. The natural bluff and exposed rocky shorelines of Yerba Buena, Alcatraz, and Angel islands, the Marin Headlands, Tiburon Peninsula, and portions of San Francisco's north shoreline and area within the Golden Gate National Recreation Area, interspersed with sandy pocket beaches, provide a different assortment of ecological niches than the quarried riprap rock areas found along Treasure, Alcatraz, and Angel islands, and areas along the north shoreline of San Francisco, and Marin County. NPS lands contain sandy beach intertidal habitat at Fort Baker, the Presidio, Aquatic Park, and Crissy Field.

Because of their proximity to and influence by coastal ocean water flowing through the Golden Gate, Central Bay intertidal invertebrate and algae communities contain many coastal hard substrate taxa (NOAA 2007; AMS 2009b) interspersed with typical estuarine taxa (AMS 2009b). The intertidal biological communities in the Central Bay also include both native and non-native species (AMS 2009b).

The angular and piled rip-rap rocks that have been placed to protect numerous shoreline locations in Central Bay have been observed to provide additional habitat for a more diverse invertebrate community than observed in natural hard substrate intertidal locations because of the increased and protected surface area created by the piled rocks. These protected pockets provide numerous havens in which assorted marine species are able to survive and flourish (AMS 2009b). Recent intertidal studies at Alcatraz, Yerba Buena, and Treasure islands show a predominance of coastal species along the western facing rocky shorelines and more bay-like and estuarine species along the eastern shorelines. Dominant taxa on the natural rocky intertidal habitat at these islands includes an

assortment of red, green, brown, and coralline algae along with chitons (*Mopalia* spp., *Cyanoplas hartwegii*), snails (*Acanthinucella* spp., *Littorina pelan/scatulata*, *Tegula funebris*, *Nucella emarginata/ostrea*), limpets (*Lottia* spp.), crabs (*Paguras*), and barnacles at Alcatraz (UCSC 2011) and Yerba Buena islands (AMS 2009b). Similar taxa have been reported at Treasure Island with an apparent increased occurrence of invertebrates because of the increased protected surface areas as discussed above (AMS 2009b). Natural and artificial rocky intertidal habitat is present at NPS lands at Fort Baker, Fort Mason, the Presidio, Crissy Field, Aquatic Park, and Alcatraz Island.

The concrete, wood, and composite pier and wharf pilings in Central San Francisco Bay also provide both intertidal and subtidal habitat for marine biota. A reconnaissance survey of marine biota attached to Port pilings at Piers 19-29, 26-32, and along the Marina Green and Aquatic Park in March 2011 observed multiple species of barnacles, chitons, limpets, mussels, bryozoans, and tunicates, along with the native oyster (*Ostrea lurida*) and the sea star (*Pisaster ochraceus*). Observed algae included the green algae *Ulva* spp., the brown algae (*Egregia menziesii*), and the red algae (*Polyneura latissima*). Additional species of algae are expected to be present but were difficult to identify due to the season of the survey. Both the hybridized bay mussel (*Mytilus trossulus/galloprovincialis*) and the coastal mussel (*M. californianus*) were observed (AMS 2009b). Pier piling intertidal habitat occurs at Fort Mason, Alcatraz Island, and Fort Baker on NPS lands.

Subtidal Habitats. Central San Francisco Bay contains both soft sediment and hard substrate subtidal (submerged) habitat. Soft bottom substrate ranges between soft mud with high silt and clay content and areas of coarser sand. These latter tend to occur in locations subjected to high tidal or current flow. Soft mud locations are typically located in areas of reduced energy that enable deposition of sediments that have been suspended in the water column, such as in protected slips, under wharfs, and behind breakwalls and groins.

The Central Bay region has the largest accumulation of natural hard substrate in the Bay-Delta. The hard substrate benthos in San Francisco Bay consists of both natural and artificial surfaces. Natural substrates include boulders, rock face outcrops, and low relief rock. Artificial hard substrate includes submerged concrete breakwalls, bulkheads, vessel structures, pilings, riprap, and pipelines. Pilings, riprap, and pipelines can be found in every San Francisco Bay region and are a dominant feature along the Port's waterfront. The western portion of the Central Bay, between Alcatraz Island and the Golden Gate, contains four submerged rocks or pinnacles: Arch Rock, Harding Rock, Shag Rock, and Blossom Rock. Several of these rise to within 40 feet of the sea surface. Most of these rock features were flattened to minimize navigation hazards when transiting the Bay. As a result, each of these natural features is surrounded by rubble and boulder fields.

These hard substrate areas provide habitat for an assemblage of marine algae, invertebrates, and fishes, similar to the hard substrate in the intertidal zone of the Central Bay. Submerged hard bottom substrate is typically covered with a mixture of turf organisms dominated by hydroids, bryozoans, tunicates, encrusting sponges, encrusting diatoms, and anemones. Pacific rock crab (*Cancer antennarius*) and the red rock crab (*C. productus*) inhabit rocky, intertidal and subtidal areas in the Pacific Ocean and likely use San Francisco Bay as an extension of their coastal habitats (Hieb 1999a). The Pacific and red rock crabs are frequent targets of sport anglers from piers and jetties.

The predominant seafloor habitat in the project area is unconsolidated soft sediment composed of combination of mud/silt/clay, sand, and pebble/cobble, with varying amounts of intermixed shell fragments. Exposure to wave and current action, temperature, salinity, and light penetration determine the composition and distribution of organisms within these soft sediments (NOAA 2007). The unconsolidated gravel, sand, and silt sediments of the Central Bay can be subdivided into deepwater channels, slough channels, harbor, and shallow subtidal topographies, each exhibiting different sediment and ecological compositions and associated biological communities (NOAA 2007). The western portion of the Central Bay, including the proposed AC34 race area, is characterized as coarse sand and gravel with shifting sands, muddy-sand and sandy-mud in the lee of the islands, and sand and sandy mud in the shallows and Port areas (NOAA 2007).

The harbor and main channel areas of the Central Bay are characterized as a mix of the benthic communities from surrounding areas (deep and shallow-water and slough marine communities). As a result of increased water flow and sedimentation in the harbor areas of the Central Bay, the majority of the species reported inhabiting seafloor sediments in this region of the Bay-Delta are deposit and filter feeders. The muddy-sand benthic community of the Central Bay is composed primarily of a diverse polychaete community.

The most common large mobile invertebrate organisms in the Central Bay include blackspotted shrimp (*Crangon nigromaculata*), Bay shrimp (*Crangon franciscorum*), Dungeness crab (*Metacarcinus magister*), and slender rock crab (*Cancer gracilis*). Although other species of shrimp are present in the Central Bay, their numbers are substantially lower when compared to the number of bay and blackspotted shrimps present (NOAA 2007). The abundance of blackspotted shrimp typically peaks from May through August, and again from December to February (Hieb 1999b). These shrimp most likely use San Francisco Bay as an extension of their coastal habitat (Hieb 1999b). All of these mobile invertebrates are present throughout the Central Bay and provide an important food source for carnivorous fishes, marine mammals, and birds in San Francisco Bay's food web. Dungeness crabs use most of the Bay as an area for juvenile growth and development prior to returning to the ocean as sexually mature adults (Tasto 1979).

Many different fish species spend all or part of their life cycle in association with the demersal (seafloor) zone and its habitats. These species include flatfish, gobies, poachers, eelpouts, and sculpins, which all live in close association with the soft substrate benthos during their sub-adult and adult life. Others, such as salmon, steelhead, longfin smelt, and other fish species, will use the benthos for foraging. In total, 53 demersal fish species have been collected from the CDFG IEP monthly fish collections between 2005 and 2009 (IEP 2005-2009). Of these species, 12 dominate the community structure, constituting 98 percent of the species inhabiting the seafloor and immediately adjacent waters in both the deep and shallow water regions of the Central Bay: These include the Bay goby (*Lepidogobius lepidus*), English sole (*Parophrys vetulus*), speckled sanddab (*C. stigmaeus*), plainfin midshipmen (*P. notatus*), Pacific staghorn sculpin (*Leptocottus armatus*), shiner perch (*C. aggregata*), cheekspot goby (*Ilypnus gilberti*), Longfin smelt (*S. thaleichthys*), white croaker (*G. lineatus*), bonyhead sculpin (*Artedius notospilotus*), Pacific sandab (*Citharichthys sordidus*), and bay pipefish (*Syngnathus leptorhynchus*). The remaining 41 taxa account for less than 0.1% (IEP 2005-2009).

Managed, protected, or other fish species of concern or special significance observed inhabiting Central Bay seafloor areas include Pacific sardine (*S. sagax*), English sole (*P. vetulus*), Pacific sanddab (*C. sordidus*), lingcod (*Ophiodon elongates*), brown rockfish (*S. auriculatus*), kelp greenling *Hexagrammos decagrammus*), leopard shark *Triakas semifaciata*), spiny dogfish shark (*Squalus acantias*), skates (*Raja* spp.), cabezon (*Scopaenichthys marmaoratus*), Pacific herring (*C. pallasii*), and longfin smelt (*Spirinchus thaleichthys*).

Anadromous species use the San Francisco Bay estuary on their way up rivers to spawn and as a rearing area for juveniles on their way down from their birthplace in the river to the open ocean (NOAA 2007). Native anadromous species include Chinook salmon (*Oncorhynchus tshawytscha*), steelhead trout (*O. mykiss gairdneri*) and both green and white sturgeon (*Acipenser medirostris* and *A. transmontanus*). Central San Francisco Bay is designated as essential fish habitat for Chinook and Coho salmon, Green sturgeon, steelhead, and assorted fish species included in the Coastal Pelagic, Pacific Groundfish, and Pacific Coast Salmon Fishery management plans. Section 4.5 provides additional detail on the Magnuson-Stevens Fishery Conservation Act and the fish species included in the Pacific groundfish, Pacific Coast Salmon, and Coastal Pelagic Fishery management plans.

Submerged Aquatic Vegetation

Subtidal plants and submerged aquatic vegetation occur throughout the Central Bay on both soft and hard substrate. Because of the highly turbid waters of the Bay, the water depth to which these plants can grow is generally limited to very shallow waters of the Bay. On the shallow unconsolidated subtidal habitat within the Central Bay, such as in Clipper Cove and along the intertidal mudflats in Richardson Bay, the green algae (*Ulva/Enteromorpha*), papenfuss (*Gracillaria verrucosa*, formerly *pacifica*), widegon grass (*Ruppia maritima*), pondweed (*Potamogeton pectinatus*), and eelgrass (*Zostera marina*) frequently occur (NOAA 2007). *Zostera* is a shallow subtidal as well as intertidal flowering plant found inhabiting bays, estuaries, and the leeward side of islands, such as Treasure, Angel, Yerba Buena, and Alcatraz (Merkel & Associates 2010). More information on Central Bay eelgrass beds is presented below. Submerged aquatic vegetation beds and plants are primary spawning habitat for many invertebrate and vertebrate species in San Francisco Bay, most notably Pacific herring (NOAA 2007).

In addition to eelgrass beds discussed above, because of the strong ocean influence in the Central Bay, additional species of red and brown algae are found attached to submerged and intertidal hard substrate, including pier pilings. All submerged aquatic vegetation in the Central Bay is considered critical essential fish spawning habitat for Pacific herring, see the subsection entitled “Sensitive Natural Communities” included in Section 3.5.2.2, Special-Status Species, below.

3.5.2.2 Special-Status Species

Appendix F includes an annotated table of all protected-status marine species potentially present in the project area, as well as a brief summary of presence/absence of suitable habitat and distribution notes. The following are brief descriptions of special status fish, invertebrates, marine mammals, and plants inhabiting Central San Francisco Bay that have potential to be impacted by the proposed project.

Federally Listed Threatened and Endangered Species

Under the federal Endangered Species Act (federal ESA), specific marine invertebrates, mammals, and fish that inhabit the waters of Central San Francisco Bay are provided special protected status as a result of having been identified as either endangered or threatened. Additionally, species that are under consideration for protected status by the NMFS or USFWS are afforded similar consideration when evaluating potential impact from proposed federal action while being evaluated for full status. The following taxa are considered protected under the federal ESA.

Sacramento River Winter-Run Chinook Salmon (*Oncorhynchus tshawytscha*). Sacramento River winter-run Chinook salmon is federally and state-listed as endangered. Winter-run Chinook salmon migrate and spawn from mid-December to August, along the Sacramento River, up to Keswick Dam in Shasta County. Adult winter-run Chinook salmon can be found in San Francisco Bay beginning November through December.

Central Valley Spring-Run Chinook Salmon (*O. tshawytscha*). The spring-run Chinook salmon has a similar life history to the winter-run salmon but begins its spawning migration to the Sacramento/San Joaquin Delta in late winter to spring. Adults are found in San Francisco Bay during the migratory period in the spring, and juveniles have the potential to inhabit the Bay in the fall, winter, and spring. Spring-run Chinook may occur in the Central Bay and in the vicinity of the project area in low numbers during planned project activities.

Central Valley Fall-Run/Late Fall-Run Chinook Salmon (*O. tshawytscha*). Adult fall-run/late fall-run Chinook salmon, a species of concern for USFWS and NMFS, begin their migration toward their spawning grounds in June, with a peak in September. They spawn in the Sacramento/San Joaquin Delta during December and January (USFWS 1999). Juvenile salmon potentially occur in San Francisco Bay in the late winter through summer. Central Valley fall-run/late-run Chinook salmon can be expected to transit through the project area when project-related Port improvements would occur and during AC34 events in the Central Bay region of the San Francisco Bay-Delta during race activities.

Central Valley Steelhead Trout (*O. mykiss*). The Central Valley steelhead is federally listed. Central Valley steelhead migrate between the ocean and the Sacramento and San Joaquin Rivers and their tributaries via San Francisco and San Pablo Bays. Upstream migration occurs in the winter, with peak spawning occurring December through April (McEwan and Jackson 1996). Most Central Valley steelhead juveniles rear in freshwater for one to two years and can be found migrating downstream at any time of the year, with peak emigration typically occurring in the spring.

Central California Coast Coho Salmon (*O. kisutch*). The Central California Coast Coho salmon is federally listed. Adult Coho migrate through San Francisco Bay after heavy late fall or winter rains to spawn in the Sacramento/San Joaquin Delta. Juvenile Coho potentially occur in San Francisco Bay in the spring, summer, and fall and are predominantly present in the northernmost areas of Central Bay and therefore not anticipated to be present in the waters of Central Bay used by AC34 activities.

Central California Coast Steelhead Trout (*O. mykiss*). The Central California Coast steelhead trout is federally listed. Steelhead are rare in most streams that are tributary to San Francisco Bay. Central

California Coast steelhead migrate from the Pacific coast through San Francisco Bay in the winter to spawn in freshwater in the upper Sacramento River (McEwan and Jackson 1996).

Green Sturgeon (*Acipenser medirostris*). This anadromous (migrating from the sea to fresh water to spawn) fish is the most widely distributed member of the sturgeon family and the most marine-oriented of the sturgeon species. It is listed as a federal threatened species and as a state species of concern. Green sturgeons range in nearshore coastal waters from Mexico to the Bering Sea and are common occupants of bays and estuaries along the western coast of the United States (Pyle et al 1995). Adults in the San Joaquin Delta are reported to feed on benthic invertebrates including shrimp, amphipods, and occasionally small fish (Moyle et al 1995), while juveniles have been reported to feed on opossum shrimp and amphipods. Adult green sturgeons migrate into freshwater beginning in late February with spawning occurring in March through July and peak activity in April and June. After spawning, juveniles remain in fresh and estuarine waters for one to four years and then begin to migrate out to the sea (USFWS 2000).

Longfin Smelt (*Spirinchus thaleichthys*). Longfin smelt, a California listed endangered species, is currently under reconsideration as a special-status species by the USFWS (USFWS 2011b). The longfin smelt is a pelagic (living in open water) schooling fish known to inhabit the San Francisco Bay-Delta, including all of the waters of the Central Bay including the waters in and adjacent to the Port of San Francisco, along the west shoreline of Treasure Island, and in the Central Bay where AC34 race activities are proposed to occur (IEP 2005-2009a, b). Although observed in Central San Francisco Bay waters throughout the year, longfin smelt migrate to the fresher water of the Delta to spawn in the winter, returning to Bay waters in late spring. No critical habitat has been designated for this species.

Marine Mammal Act Protected Species

Under the Marine Mammal Protection Act (MMPA), all marine mammals are protected from “take,” which is defined as “. . .to harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect.” Marine mammals known to be present within the project area during proposed activities are presented below.

Harbor Seal (*Phoca vitulina richardsi*). The harbor seal is a year-round resident in San Francisco Bay and is routinely seen in waters off all of the Bay islands, including Alcatraz, Angel, Treasure, and Yerba Buena. Harbor seals are protected under the Marine Mammal Protection Act. Harbor seals have permanent colonies at Castro Rocks in San Pablo Bay, Yerba Buena Island in the Central Bay, and Mowry Slough in the South Bay (NOAA 2007) as well as at Yerba Buena Island on property contained within the U.S. Coast Guard Station on the southwest corner of the island. The Yerba Buena haul-out has not been historically identified as a pupping site for harbor seals, but recent observations suggest that occasional pupping may occur there (Green et al. 2006). The haul-out area is within the region of influence but not within the boundaries of the proposed project. Harbor seals can also be frequently seen hauled out at temporary locations of opportunity such as the sandy beach and rocks of Bonita Cove and Little Alcatraz rocks. The current Bay-Delta harbor seal population is estimated at between 500 and 700 individuals (Green and Grigg 2006). Harbor seals feed in the deepest waters of the Bay, with the region from the Golden Gate to Treasure Island and south to the San Mateo Bridge being the

principal feeding site (Kopec and Harvey 1995). Harbor seals feed on a variety of fish, found within Central Bay such as perch, gobies, herring, and sculpin.

California Sea Lion (*Zalophus californianus*). Like the harbor seal, the California sea lion is a long-term resident in the San Francisco Bay Estuary and also protected under the Marine Mammal Protection Act. A common, abundant marine mammal, they use the San Francisco Bay Estuary for refuge and foraging but do not breed or pup within the Bay. California sea lions occur within the Bay Estuary in their highest numbers while migrating to and from their primary breeding areas on the Farallon and California Channel islands, and when Pacific herring and salmon inhabit Bay-Delta waters to spawn or migrate to upriver spawning areas. Sea lions can be regularly spotted hauled out on opportunistic offshore rocks, sandy beaches, and onto floating docks, wharfs, vessels, and other man-made structures within the Bay and along the shorelines of the Bay and Bay islands. The largest California sea lion haul-out in San Francisco Bay has been at the Port of San Francisco Pier 39, where up to 800 sea lions have been historically counted. Sea lions are also frequently observed opportunistically hauled out on the rocks or large navigation buoys at Alcatraz Island. This group of sea lions has decreased in size in recent years, coincident with a fluctuating decrease in the herring population in the Bay. Sea lions often float on the surface in large groups of 10 to 20 after feeding. California sea lions feed on a wide variety of seafood, mainly squid and fish and sometimes even clams. Commonly eaten fish and squid species include salmon, hake, Pacific whiting, anchovies, herring, schooling fish, rockfish, lamprey, dog fish, and market squid (Subtidal Habitat Goals 2011). California sea lions may forage in the waters of and adjacent to the project area.

Harbor Porpoise (*Phocoena phocoena*). Harbor porpoises can be observed in the Bay at any time of the year, although they do not solely inhabit the Bay-Delta but use both the waters of the Bay-Delta as well as nearshore coastal waters. The harbor porpoise is a nearshore species, commonly observed near the Golden Gate Bridge and open water areas of the Central Bay, especially between the Golden Gate, Angel Island, and Alcatraz Island. Depending on the tide, they frequently forage for prey fish near Cavallo Point and Yellow Bluff offshore Fort Baker during ebbing (outgoing) tides (Kenner 2011). The San Francisco Bay-Russian River stock, identified as a unique genetic group, ranges from Point Arena to Monterey Bay. At present, no accurate estimates of the size of the San Francisco Bay-Russian River population exist (NOAA 2007). Unlike some of their cousins, harbor porpoises typically avoid boats and humans and are usually seen in groups of 2 to 5 individuals, although recently larger groups of individuals have been reported in the area between the Golden Gate, Angel Island and Alcatraz Island, especially during peak tidal flow (Kenner 2011). The primary food for harbor porpoises is fish and squid.

Elephant Seals (*Mirounga angustirostris*). Northern elephant seals are found in the eastern and central North Pacific Ocean. They range as far north as Alaska and as far south as Mexico, with established Central California breeding colonies on the Farallon Islands, at Año Nuevo State Park, and near San Simeon, California.

Northern elephant seals are the largest phocid, or “true” seal, in the Northern Hemisphere and are year round inhabitants along the Pacific coasts of Mexico, the United States, and Canada. These large animals spend most of their lives at sea, coming to shore only to molt, give birth, and mate. Establishing pupping colonies in Central California are located at Año Nuevo State Park, near San Simeon, at Chimney Rock in the Point Reyes headlands, and in the Farallon Islands. In recent years, young-of-

the-year individuals have been observed hauling out on the sandy beach at Crissy Field. These sightings have primarily occurred April to August with occasional occurrences in October and November (Personal Communication- Marine Mammal Center 2011).

Breeding season typically begins in December of each year with females and pups remaining onshore to nurse and grow for several months. Females and juveniles will come onshore to molt between April and May and sub-adult males between May and June. Adult males molt onshore between July and August. Elephant seals feed at sea on rays, skates, rat fish, squid, and small sharks.

California Gray Whale (*Eschrichtus robustus*). California gray whales are frequent transients along the California coast as they migrate from the waters of the Western Bering Sea where they feed during the summer months to Baja California, where they breed during the winter. They are typically observed migrating southward along the Central California coast between December and February and then again heading northward between February and July. The population of California gray whales may have recently reached a level thought to be near carrying capacity (approximately 26,000 animals), which may account, in part, for why more gray whales, presumably juveniles and post-weaning females, have been observed foraging along the nearshore coastline of California, Oregon, Washington, and British Columbia. These individuals appear to be taking up temporary residence at these locations during the summer months rather than migrating northward to Alaska, as do the bulk of the population (Summich 1985). Gray whales primarily feed on benthic prey, such as amphipods.

During the migration, gray whales will occasionally enter rivers and bays along the coast, including San Francisco Bay, either because they are disoriented or to forage. Gray whales have been observed irregularly over recent years in the Bay between December and April and are considered infrequent visitors.

Humpback Whale (*Megaptera noveangliae*). Humpback whales are found in all the major oceans, from the equator to sub-polar latitudes, and are frequent inhabitants of coastal waters and bays. Humpback whales are well known for their long “pectoral” fins, which can be up to 15 feet (4.6 meters) in length. Their scientific name, *Megaptera novaeangliae*, means “big-winged New Englander” as the New England population was the one best known to Europeans. These long fins give them increased maneuverability; they can be used to slow down or even go backwards.

In the North Pacific, there are at least three separate populations, of which one inhabits the waters of California, Oregon, and Washington. This population winters in coastal Central America and Mexico and migrates to areas ranging from California to southern British Columbia in summer and fall. When migrating, humpbacks stay near the surface of the ocean. Humpbacks filter feed on tiny crustaceans (mostly krill), plankton, and small fish and can consume up to 3,000 pounds (1,360 kilograms) of food per day.

Humpback whales are occasional visitors to the San Francisco Bay-Delta between April and December, with sightings as recent as 2007, when a pair swam up the Sacramento River as far as Sacramento before returning south to the Bay and the Pacific Ocean (API 2007).

Managed U.S. Fisheries Species (Magnuson-Stevens Act)

Under the Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-297), the National Marine Fisheries Service (NMFS), Fishery Management Councils, and federal agencies are required to cooperatively protect essential fish habitat for commercially important fish species such as Pacific coast groundfish, three species of salmon, and five species of coastal pelagic fish and squid. As defined by Congress, essential fish habitat includes “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Those fish species present in Central San Francisco Bay included in Fishery Management Plans prepared by regional Fishery Management Councils under the Magnuson-Stevens Act are listed in **Table BIO-1**.

TABLE BIO-1: MANAGED FISH SPECIES IN CENTRAL SAN FRANCISCO BAY UNDER THE MAGNUSON-STEVENS ACT

Fisheries Management Plan	Species, Common Name	Species, Scientific Name	Life Stage	Abundance
Coastal Pelagic	Northern anchovy	<i>Engraulis mordax</i>	J, A	Abundant
	Jack mackerel	<i>Trachurus symmetricus</i>	E,L	Present
	Pacific sardine	<i>Sardinops sagax</i>	J, A	Present
Pacific Groundfish	English sole	<i>Parophrys vetulus</i>	J, A	Abundant
	Sand sole	<i>Psettichthys melanostictus</i>	L, J, A	Present
	Curlfin sole	<i>Pleuronichthys decurrens</i>	J	Rare
	Pacific sanddab	<i>Citharichthys sordidus</i>	E, L, J, A	Present
	Starry flounder	<i>Platichthys stellatus</i>	J, A	Present
	Lingcod	<i>Ophiodon elongatus</i>	J, A	Present
	Brown rockfish	<i>Sebastes auriculatus</i>	J	Present
	Pacific whiting (hake)	<i>Merluccius productus</i>	E,L	Present
	Kelp greenling	<i>Hexagrammos decagrammus</i>	J, A	Present
	Leopard shark	<i>Triakis semifasciata</i>	J, A	Present
	Spiny dogfish	<i>Squalus acanthias</i>	J, A	Present
	Skates	<i>Raja</i> ssp.	J, A	Present
	Soupfin shark	<i>Galeorhinus galeus</i>	J, A	Rare
	Bocaccio	<i>Sebastes paucispinis</i>	J	Rare
Cabezon	<i>Scorpaenichthys marmoratus</i>	J	Present	
Pacific Coast Salmon	Chinook salmon	<i>Oncorhynchus tshawytscha</i>	J, A	Seasonally Present
	Coho salmon	<i>Oncorhynchus kisutch</i>	J, A	Historically Present, Current Occurrence unknown
<p>NOTES: A = Adult J = Juvenile L = Larvae E = Egg</p> <p>SOURCE: National Marine Fisheries Service (now known as NOAA Fisheries) Southwest Region (NMFS SWR), 2001, “Fisheries Management Plan Species Distributions in San Francisco, San Pablo and Suisun Bays,” available on the Internet at <http://swr.nmfs.noaa.gov/hcd/loclist.htm>, viewed on April 10, 2011; and Interagency Ecological Program for the San Francisco Bay Estuary (IEP), <i>San Francisco Bay Study, 2005-2009</i>, unpublished raw midwater trawl data and unpublished raw bottom trawl data, 2005-2009.</p>				

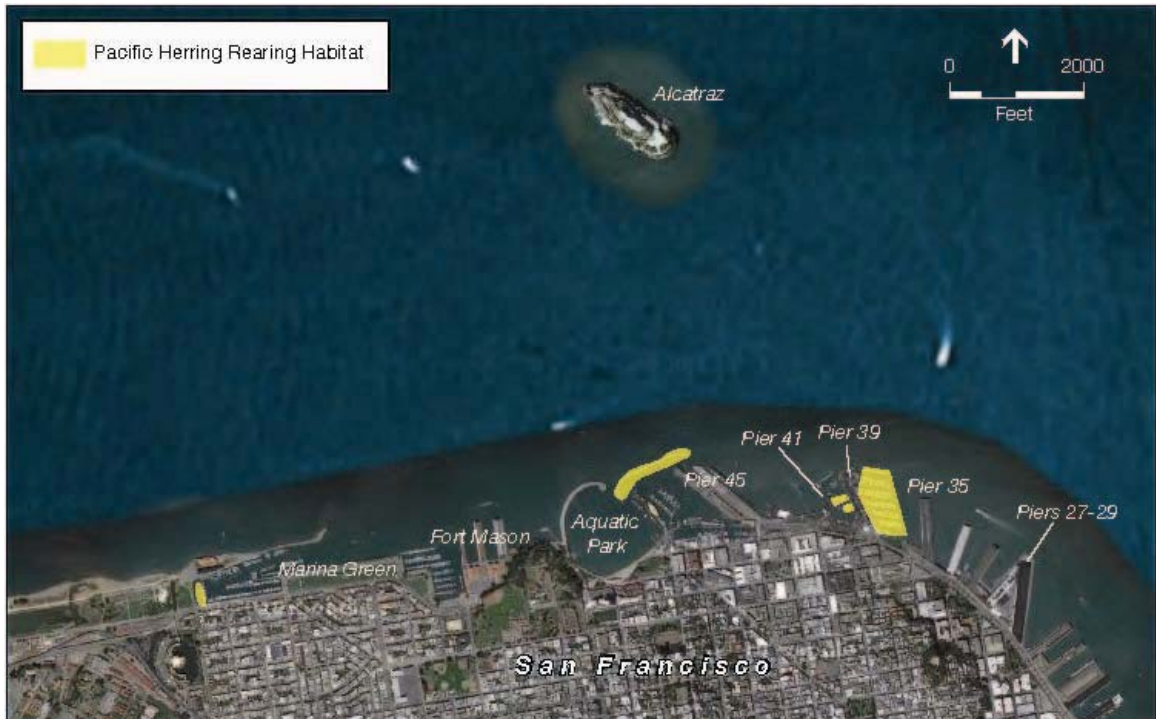
Non-Listed Species Meriting Special Consideration

Pacific Herring (*Clupea pallasii*). Pacific herring (*Clupea pallasii*) is neither a protected species under the federal ESA nor a managed fish species under the Magnuson-Stevens Act. Pacific herring does, however, represent a species of special concern and sensitivity for San Francisco Bay since it is an important member of the San Francisco Bay marine ecosystem; provides an important food source for special status marine mammals, sea birds, and fish.

Pacific herring are found throughout the coastal zone from northern Baja California northward around the rim of the North Pacific Basin to Korea. In California, herring forage offshore during spring and summer and then migrate inshore to bays and estuaries to spawn October through April. Known spawning areas in California include San Diego Bay, San Luis River, Morro Bay, Elkhorn Slough, San Francisco Bay, Tomales Bay, Bodega Bay, Russian River, Noyo River, Shelter Cove, Humboldt Bay, and Crescent City Harbor (Bartling 2006). The largest spawning aggregations in California occur in the San Francisco Bay-Delta and Tomales Bay. Most spawning areas are characterized as having reduced salinity with calm, protected waters. Spawning-substrate such as submerged aquatic vegetation beds, especially eelgrass beds, or rocky intertidal areas are preferred, but man-made structures such as pier pilings and riprap are also frequently used spawning substrates in San Francisco Bay (Bartling 2006). After hatching, herring fry and juveniles use nearby protected inshore waters for rearing habitat (Lassuy 1989). Areas of identified Pacific herring rearing habitat within Central San Francisco Bay and along the northern San Francisco waterfront are illustrated in **Figure BIO-5** and past known Central Bay spawning grounds are illustrated in **Figure BIO-6** (NOAA 2011). These include offshore NPS property at Fort Baker (including Horseshoe Bay) and the San Francisco Maritime Museum.

Native Olympia Oysters (*Ostrea lurida*). The Olympia oyster (*Ostrea lurida*), also known as the “native oyster,” is native to most of western North America and, prior to overharvesting and increased siltation from hydraulic mining in the mid-19th century, was a key component of the San Francisco Bay marine ecosystem (NOAA 2008). Olympia oysters inhabit brackish water conditions but prefer salinities above 22 parts per thousand. In their natural state, Olympia oysters form sparse to dense beds in coastal bays and estuaries and in drought conditions will move up into channels and sloughs, dying off when wetter conditions return. Olympia oysters are not reef builders like their East and Gulf Coast cousin, *Crassostrea virginica*. Olympia oysters are known to provide high biodiversity habitat because they provide physical habitat structure sought by juvenile fish and crustaceans, worms, and foraging fish and birds (Subtidal Habitat Goals 2010b). They also stabilize sediment, reduce suspended sediment, and improve light penetrations, thereby improving the physical conditions that encourage the establishment of submerged aquatic vegetations, such as eelgrass beds (*Zostera marina*). Additionally, a robust population of filter feeders can help modulate plankton blooms (Subtidal Habitat Goals 2010b).

Naturally occurring populations of native oysters can be found throughout San Francisco Bay on natural and artificial hard substrate from Carquinez Strait to the South Bay. Intertidally they occur between Point Pinole to south of the Dumbarton Bridge, with the highest reported abundances of 80 per square meter in the Central Bay (Subtidal Habitat Goals 2010b). Oysters have appeared to do well subtidally in many man-made habitats such as on marina floats and in tidally restricted ponds, lagoons, and saline lakes. Native oysters have been reported inhabiting the intertidal and subtidal



SOURCE: NOAA, 2011.

Figure BIO-5

Pacific Herring Rearing Habitat along the San Francisco Northern Waterfront (shown as shaded area adjacent to Pier 39 and offshore Hyde Street Pier and Fisherman's Wharf)



SOURCE: NOAA, 2011.

Figure BIO-6

Pacific Herring Spawning Areas in Central San Francisco Bay

rocks composing the riprap shoreline of Treasure Island (AMS 2009), on wharf pilings of the Port of San Francisco (AMS 2010), and in Richardson Bay and along the Richmond shoreline (Subtidal Habitat Goals 2010b). Although thought to be extinct from the Bay since the mid-19th century, native oysters have been observed in various locations in San Francisco Bay since 2000 (Subtidal Habitat Goals 2010b). Their presence in other rocky intertidal, rocky subtidal, and man-made habitats in Central San Francisco Bay, including Alcatraz and Angel islands, is expected.

Threats to Olympia oysters include predation from indigenous and non-native marine snails (*Acanthina spirata* and *Urosalpinx cinerea*, respectively), birds, bat rays, and crabs. Limited suitable hard substrate and physical water quality conditions are also important parameters (Subtidal Habitat Goals 2010b). Olympia oysters do not appear to prosper in areas of high siltation.

Sensitive Natural Communities

Within San Francisco Bay, there are many marine communities and habitats that can be considered particularly sensitive to disturbance or possess unique or special ecological value (Subtidal Habitat Goals 2010c). Additionally, certain waters of the U.S. are considered “special aquatic sites” because they are generally recognized as having unique ecological value. Such sites include sanctuaries and refuges, mudflats, wetlands, vegetated shallows, eelgrass beds, and coral reefs. The coastal and Bay waters immediately adjacent to the GGNRA are classified as a Marine Protected Area. Special aquatic sites are defined by the United States Environmental Protection Agency (U.S. EPA) and may be afforded additional consideration in the permit process for a project requiring federal agency approvals or covered under federal regulations. Within Central San Francisco Bay, two sensitive natural communities that are routinely afforded special attention are submerged aquatic vegetation beds, such as eelgrass beds (described below), and native oyster beds (described in the previous section).

Eelgrass (*Zostera marina*) is a native marine vascular plant indigenous to the soft-bottom bays and estuaries of the Northern Hemisphere. It has been afforded special management considerations by CDFG, USFWS, National Marine Fisheries Service (NMFS), U.S. EPA, Bay Conservation and Development Commission (BCDC), and Golden Gate Audubon Society. NOAA National Marine Fisheries Service considers eelgrass beds to be a habitat area of particular concern (HAPC). The species is found from middle Baja California and the Sea of Cortez to northern Alaska along the west coast of North America and is common in healthy, shallow bays and estuaries. The depth to which this species can grow is a function of light penetration. At greater depths, light is reduced to a level below which photosynthesis is unable to meet the metabolic demands of the plant to sustain net growth.

Figure BIO-7 shows eelgrass beds near the project area.

Eelgrass beds perform multiple functions within an estuarine ecosystem. They are considered a “habitat-forming” species that creates unique biological environments for spawning Pacific herring (NOAA 2007) and serve as nursery grounds for many important Bay fish including Pacific herring, halibut, and English sole. They provide substrate for epibenthic algae, invertebrates, and crustaceans and important rearing habitat for invertebrate species such as shrimp (*Palaemonetes paludosus*) and Dungeness crabs (*Cancer magister*). Eelgrass beds also provide important foraging areas for waterfowl such as black brandt (*Branta bernicla nigricans*) (Merkell & Associates 2005) and American wigeon (*Anas americana*).



AC34 / Environmental Assessment (201317)
Figure BIO-7
 Eelgrass Beds Near AC34 Project Area

SOURCE: Google Earth Maps; ESA; Habitat Goals Project

In addition to providing refugia for young fish, eelgrass beds stabilize shorelines by dampening wave energy, collecting sediments transported to the shore, and preventing shore erosion. They also improve water quality by collecting and filtering organic matter and sediments. This filtering also acts as a nutrient pump, transferring waterborne nutrients to the sediments and invertebrates.

Eelgrass is easily affected by changes in water quality and turbidity. Eelgrass beds are extremely dynamic, expanding and contracting by as much as several hectares per season depending on the quality of the site. The largest eelgrass beds in the estuary are in shallow subtidal regions of San Pablo and Richardson bays, with smaller beds scattered in shallow areas between the Carquinez Strait and Hayward. Within the Central Bay, eelgrass beds are located in Richardson Bay, off the north and east shorelines of Treasure Island and within Clipper Cove between Treasure Island and Year Buena Island, along the Tiburon peninsula, and along the east shore of Angel Island (Merkell & Associates 2010). Comprehensive eelgrass surveys of the San Francisco Bay-Delta have been conducted in 1987, 2003, and 2009. The 1987 survey reported a total of 316 acres of eelgrass beds in the San Francisco Bay-Delta (Merkell & Associates 2010). The 2003 and 2009 surveys, which employed both high-resolution acoustic mapping and helicopter aerial imagery, reported 2,622 and 3,707 acres of eelgrass beds, respectively, present in the San Francisco Bay-Delta. Between 2003 and 2009, eelgrass beds Baywide have increased 28.7 percent and between the 1987 and 2009 surveys, almost 1,100 percent (Merkell & Associates 2010). This increase in bed densities and aerial extent as well as establishment in new areas of the Bay-Delta are in part the result of improved water clarity over the past decade and regulatory actions to protect and enhance eelgrass beds as an important natural resource of the San Francisco Bay-Delta marine ecosystem (Merkell & Associates 2010).

Primary physical threats to submerged aquatic vegetation and eelgrass beds in San Francisco Bay include activities associated with shipping and boating, which can disrupt seagrass beds directly through destruction of plants by boat propellers, anchors and anchor chains, dredging, and construction of facilities (e.g., docks, harbors, breakwaters, ports). Indirect effects arise through increased suspended sediments due to dredging and boat wakes, or shading from structures such as docks. Hardening of the shoreline can reflect waves, increasing wave action and limiting or destroying beds. Most of these threats apply to eelgrass in the San Francisco Bay estuary but are focused in localized areas. Impacts from dredging seem to have a limited spatial and temporal effect; damage from boat anchors, shoreline development, and ship wakes is also likely to be localized. Oil spills can inundate and smother eelgrass beds, particularly those in the intertidal or shallow subtidal zones. Eelgrass beds may respond to rising sea level by establishing closer to the present-day shoreline and dying out at greater depths. The dwindling sediment supply to the estuary may decrease turbidity, allowing eelgrass to grow at greater depths but possibly also promoting competing blooms of phytoplankton (Subtidal Habitat Goals 2010c).

3.5.2.3 Invasive and Non-Native Species

New species of estuarine and marine animals are inadvertently or intentionally introduced into California waters regularly. Often referred to as introduced, non-indigenous, alien, non-native, or exotic species, most pose little or no threat to native ecosystems or biological communities. However, a few have the potential to severely disrupt local ecosystems, fisheries, and human infrastructure (Ray 2005).

San Francisco Bay and Delta have more than 230 identified introduced taxa inhabiting its estuarine and marine waters. The San Francisco Bay-Delta has been described as the most invaded estuary in North America (Ray 2005). It is currently estimated that a new aquatic species is introduced into the San Francisco Bay-Delta every 14 weeks, whereas prior to 1960 the rate was once every 55 weeks (Roman 2010). Introduced species now dominate all benthic communities within the Bay-Delta and make up more than 95 percent of the biomass and total abundance of organisms (Roman 2010). Estuaries and sheltered coastal areas appear to be among the most invaded habitats as a result of being naturally disturbed, low-diversity systems with historic centers of anthropogenic disturbance from shipping, industrial development, and urbanization (Ray 2005).

Invasive organisms are introduced by a variety of methods, the most prevalent being shipping, of which the largest single source is in ballast water. Other methods of introduction include fouling organisms that have attached themselves to ship hulls, navigation buoys, anchors, and anchor chains, such as the Asian kelp (*Undaria pinnatifida*); recovered flotsam; “live” rock and plants from the aquarium trade; the accidental release of animals from packing materials by restaurants serving live seafood; and the live bait industry (Ray 2005). In addition, many invasive species, such as striped bass, channel and white catfish, and giant pacific oysters (*Crassostrea gigas*), have been deliberately introduced into California waters. A few of the most damaging in the San Francisco Bay-Delta include the Chinese mitten crab (*Eriocheir sinensis*), the European green crab (*Carcinus maenas*), the Asian clam (*Corbula amurensis*), and the isopod (*Sphaeroma quoyanum*). The Chinese mitten crab is found throughout the Bay-Delta and is displacing native intertidal crabs. The Asian clam *Corbula* has completely changed the subtidal benthic infaunal community in the western Delta and because of its voracious feeding on bacterioplankton, phytoplankton, and copepod larvae, it has significantly reduced the phytoplankton community in the North Bay and western Delta, resulting in reduced zooplankton and fish abundances and distributions (Ray 2005; Kimmerer 2006; and Thompson and Parchaso 2003). It is one of the attributing factors to population declines in the delta and longfin smelt populations in the Bay-Delta (AFS 2007).

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3.6 CULTURAL RESOURCES

This section summarizes the cultural resources context of the project area and describes the specific resources that could be affected by the proposed 34th America's Cup (AC34) events. The regulations that implement Section 106 of the National Historic Preservation Act (NHPA) state that preparation of an EA under NEPA should include appropriate scoping, identification of historic properties, assessment of effects upon those properties, and consultation leading to the resolution of any adverse effects (36 CFR Part 800.8). To that end, this section identifies historic properties within the project area, and Section 4.6 assesses the effects of the project on these resources.

3.6.1 Area of Potential Effect

A cultural resources Area of Potential Effect (APE) was established to identify the areas within which effects to cultural resources could occur as a result of the AC34 project. As defined in the NHPA implementing regulations (36 CFR 800.16[d]), the APE for an undertaking includes the area or areas within which the undertaking may directly or indirectly cause changes to the character of a historic property, if any such properties exist. The term *historic property* also includes artifacts, records, and remains that are related to and located within such properties, and includes properties of traditional religious and cultural importance to an Indian tribe that meets National Register of Historic Places (NRHP) criteria (36 CFR 800.16[1][1]).

The APE for AC34 includes all areas where proposed event facilities and developed spectator venues would be installed, as well as all secondary viewing areas where spectators may informally congregate during race event days. Determinations of which areas could be used as potential secondary viewing locations were derived from topographical analyses and crowd modeling from other large Bay-oriented public events (e.g., Fleet Week).

Figure CUL-1 illustrates the APE. As shown in Figure CUL-1, the APE includes much of San Francisco's northern waterfront, as well as many areas in southern Marin County. As described in Chapter 2, proposed event venues and secondary viewing areas would include Crissy Field, the Presidio, Aquatic Park and other areas of SAFR, Fort Mason, Alcatraz Island, Fort Baker, the Marin Headlands, and the Golden Gate Bridge. Additional secondary viewing areas on Treasure Island, Marina Green, portions of the Port of San Francisco waterfront, and Angel Island would be possible under some of the alternatives discussed in Chapter 2. In-water project components would be located adjacent to Marina Green and Fort Mason, and adjacent to several piers along the San Francisco waterfront.

Event venues and secondary viewing locations on lands owned or managed by the City and County of San Francisco (Treasure Island, Marina Green, and Port of San Francisco) and the State of California (Angel Island) would also have a potential to affect cultural resources on those properties. Cultural resources within these portions of the APE that are not located on lands under federal jurisdiction have been identified and assessed for impacts pursuant to the California Environmental Quality Act (CEQA) in *The 34th America's Cup and James R. Herman Cruise Terminal and Northeast Wharf Plaza Environmental Impact Report (EIR)*, certified by the City and County of San Francisco (CCSF) on December 15, 2011. The EIR determined that, with mitigation (including consistency with the Secretary of the Interior's Standards for the Treatment of Historic Properties), the AC34 events would



- — — — — 2012 ACWS Race Area (ACWS August)
 - — — — — 2012 ACWS Area (ACWS October)
- — — — — 2012 AC72 Exhibition Race Area (AC72 Exhibition September/October) & 2013 Race Area
 - — — — — Contingency Race Area
- America's Cup Programmed Event Venues
 - Alternative E - APE for Cultural Resources

SOURCE: Google Maps; USCG

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Figure CUL-1
Area of Potential Effects for Cultural Resources

result in no significant impacts on cultural resources on CCSF lands. Resources on state-owned Angel Island would be protected from spectator impacts by the existing limits on daily ferry traffic to and from the island; no additional mitigation would be warranted. All of the mitigation measures recommended in the EIR have been included as integrated protection measures for the project as described in Chapter 2 of this EA. The EA focuses on the potential effects on NRHP-listed or eligible cultural resources located within event venues or secondary viewing areas that are under federal jurisdiction (NPS and Presidio Trust).

3.6.2 Section 106 Agency Compliance

Each federal agency involved in the AC43 event, including the NPS, the Presidio Trust, the United States Coast Guard (USCG), and the United States Army Corps of Engineers (Corps) is pursuing compliance with Section 106 independently, yet in a coordinated fashion, to address effects on cultural resources that may occur as a result of their permitting activities. Provided below is a summary of the various agency's compliance processes to date. As required under NHPA regulations (36 C.F.R. 800.2(d)) this Environmental Assessment (EA) provides the public with information about each agency's proposed action(s) and their effects on historic properties. The comment period following publication of this draft will provide the public with an opportunity to comment on the agency actions under consideration.

The NPS representatives initiated communication with the California State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP) in March and April 2011 regarding the process that the NPS planned to use to achieve compliance with Section 106 of the NHPA. Communications between SHPO and the NPS regarding the AC34 plans have been ongoing. The Section 106 compliance process will be governed by the Programmatic Agreements (PAs) that have been signed between SHPO, ACHP, and the NPS. In accordance with these PAs, a cultural resources conditions assessment report (AC34 Section 106 Report) is being prepared for the GGNRA and SAFR to satisfy the requirements of Section 106 to identify and address potential impacts on cultural resources on GGNRA lands within the APE. Completion of the AC34 Section 106 Report, in tandem with this EA, will satisfy the Section 106 review for both the GGNRA and SAFR.

The Presidio Trust participated in the 2011 conversations with the NPS, SHPO and ACHP described above. Because the Trust administers the inland portion of the Presidio (Area B), effects from the AC34 project are anticipated to be generalized, and related to the temporary introduction of incompatible elements that could affect the integrity of the district as a whole. The permanent buildings and structures within Area B will not be individually vulnerable to the types of spectator-use impacts anticipated with the project. Like the NPS, Section 106 compliance for any activities associated with AC34 in Area B will be managed by the Trust through its 2002 Programmatic Agreement with the SHPO, ACHP and NPS.

The USCG will be issuing a Marine Event Permit to allow the AC34 event to occur in San Francisco Bay. Activities allowed by the permit would require no construction on or physical alteration to the land or the Bay floor, and would be entirely contained within the marine environment of the Bay. As no known historic properties exist in the Bay marine environment that could be affected by the

USCG's permit activities, this agency has determined, and received SHPO concurrence, that its proposed actions would not result in any effects on historic properties (SHPO 2012).

The Corps will be making a decision regarding the issuance of a Section 10 permit under the Rivers and Harbors Act to allow the installation of temporary structures and dredging activities to occur in San Francisco Bay. If issued, the permit will allow for three types of temporary structures: (1) temporary piles and floating docks, (2) temporary cement block anchors and helical screw anchors, and (3) temporary cranes. The permit, if issued, will also allow for dredging in the waters of the Bay to deepen the areas at the following locations to accommodate the temporary berthing of race, race support, and spectator vessels:

- Piers 32- 36 Open Water Basin
- Pier 14
- Two areas south of Pier 9

Two of the proposed actions have the possibility to affect known historic properties: (1) gangway attachment to historic properties, and (2) dredging. Other project activities, such as installation of temporary piles and floating docks, installation of temporary anchors, and installation of temporary cranes, are not anticipated to affect historic properties.

Possible effects on known historic properties could occur from the installation of temporary and removable attachment points between the steel gangways, which would connect to the temporary floating docks, and a number of the historic piers and bulkhead sections that are contributors to the National Register-listed San Francisco Embarcadero Historic District. Gangways for floating docks are proposed at Piers 80, 32, 30, 14, 9, 19, 23, 27, and 29, and at Marina Green. Piers 80, 32, 30, and 14, and Marina Green are outside of the historic district and are not on the National Register. Pier 27 is not a contributing element to the historic district and is not on the National Register. Piers 9, 19, 23, and 29 are contributing elements within the historic district. The EIR prepared under CEQA found that such project activities would have a less-than-significant impact on these known historic properties because the attachment points would be temporary and removable, and because the final design of the gangway attachments would be reviewed by qualified Port preservation specialists for compliance with the Secretary of the Interior's Standards.

Potential effects on unknown and unrecorded historic properties, such as submerged marine resources, could also occur from the dredging. The areas proposed for dredging have historically been dredged to a depth deeper than the dredge depths proposed for this project. The EIR prepared under CEQA found that such project activities would have a less-than-significant impact on unrecorded historical resources. A records search with the Northwest Information Center and the State Lands Commission identified no recorded historic properties, including submerged shipwrecks, in the areas intended for dredging. Because the areas have historically been dredged to a depth deeper than currently proposed, and because the record search identified no known historic properties, effects to cultural resources are not expected. However, in the unlikely event that a cultural resource is discovered during dredge activities, a standard accidental discovery mitigation measure would be implemented.

The Corps has begun consultation with SHPO regarding effects on historic properties, and has submitted a letter describing its actions with regard to Section 106. The Corps has determined that the proposed Section 10 permitting and subsequent actions would have no adverse effect on historic properties. If SHPO concurs with this determination, the Corps' responsibilities under Section 106 will be fulfilled. Documentation relating to the Corps' Section 106 process for NHPA compliance is provided as an attachment to this document (Appendix G).

All agency documentation regarding compliance with Section 106 has been made available for public review and comment on the NPS's PEPC website: (<http://parkplanning.nps.gov/>)

3.6.3 Cultural Resources Setting

This section provides a summary of the NRHP-listed or eligible cultural resources under federal jurisdiction within the APE that could be affected by the various events or structural components associated with the AC34 project. The specific cultural resources under federal jurisdiction that could be sensitive to project effects are located on NPS (GGNRA and SAFR) or Presidio Trust lands. The Golden Gate Bridge, while not under federal jurisdiction, has been determined eligible for the NRHP and declared a National Historic Civil Engineering Landmark, and is also included as a secondary viewing area in the analysis of impacts. These resources are described in the following historic summary of each geographic location (event venue or secondary viewing area) relevant to the project.

Cultural resources include archeological resources (including human remains), historic architectural resources, and cultural landscapes. Key definitions are as follows:

- *Archeological resources* consist of pre-contact or historic-period archeological artifacts, features, and sites. Native American archeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs). Euroamerican historic-period materials (other than those associated with military installations or activities) might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse. Human remains, including burials and cremains (ashes remaining after cremation of a corpse), can be associated with both pre-contact and historic-period archeological resources.
- *Historic architectural resources* include buildings, structures (including ships), objects, and historic districts. Military-related cultural features include earthen batteries, concrete foundations, rock alignments representing walls or fences, water-conveyance features, and other artifact concentrations.
- *Cultural landscapes* are defined as "geographic areas, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values" (NPS 1994). They are composed of a number of character-defining features that, individually or collectively, contribute to the landscape's physical appearance as it has evolved over time. In addition to vegetation and topography, cultural landscapes may include water features, such as ponds, streams, and fountains; circulation features, such as roads, paths, steps, and walls; buildings; and furnishings, including fences, benches, lights, and sculptural objects.

A brief summary of the Bay Area's pre-contact and ethnographic settlement is presented below, along with a regional historic-period overview and specific history of locales relevant to the NEPA analysis of the project's potential effects.

3.6.3.1 Pre-Contact Historic Context

Since the late Pleistocene, when indigenous peoples may have first arrived in the Bay Area, the region has undergone significant environmental changes related to rising sea levels, fluctuating climate patterns, and geological events. The oldest evidence for humans in the city of San Francisco was found approximately 75 feet below the modern ground surface, during the construction of the Bay Area Rapid Transit (BART) tunnel near the Civic Center Station, at the western end of the downtown district. A human skeleton estimated to have been buried more than 5,000 years ago (CA-SFR-28) was found in a clay matrix that was once part of marshlands associated with an inland creek. The majority of known indigenous sites in the city of San Francisco are no more than 2,000 years old and are found buried at depths of approximately 10 to 20 feet below the modern ground surface. They were originally deposited within the dune sands that were blown eastward from the Pacific coast, across the peninsula. Other counties surrounding the Bay also contain evidence of occupation from the Early Holocene to the time of historic contact.

Archeologists have developed individual cultural chronological sequences tailored to the archeology and material culture of each subregion of California. Each of these sequences is based principally on the presence of distinctive cultural traits and stratigraphic separation of deposits. A framework for the interpretation of the San Francisco Bay Area is provided by Milliken et al., who have divided human history in California into three broad periods: the Early Period, the Middle Period, and the Late Period (Milliken et al. 2007). Economic patterns, stylistic aspects, and regional phases further subdivide cultural patterns into shorter phases. This scheme uses economic and technological types, socio-politics, trade networks, population density, and variations of artifact types to differentiate between cultural periods.

The *Paleoindian Period* (13,500 to 10,000 before present [B.P.]) was characterized by big-game hunters occupying broad geographic areas. Evidence of human habitation during the *Paleoindian Period* has not yet been discovered in the San Francisco Bay Area. During the *Lower Archaic* (10,000 to 5,500 B.P.), geographic mobility continued from the *Paleoindian Period* and is characterized by the millingslab and handstone as well as large wide-stemmed and leaf-shaped projectile points. The earliest cut shell beads and the mortar and pestle are first documented in burials during the *Early Period* (*Middle Archaic*; 5,500 to 2,500 B.P.), indicating the beginning of a shift to sedentism. During the *Middle Period*, which includes the *Lower Middle Period* (*Initial Upper Archaic*; 2,500 to 1,570 B.P.), and *Upper Middle Period* (*Late Upper Archaic*; 1,570 to 950 B.P.), geographic mobility may have continued, although groups began to establish longer-term base camps in localities from which a more diverse range of resources could be exploited. The first rich black middens are recorded from this period. The addition of milling tools, obsidian and chert concave-base projectile points, and the occurrence of sites in a wider range of environments suggest that the economic base was more diverse. By the *Upper Middle Period*, mobility was being replaced by the development of numerous small villages. Around 1,570 B.P. a "dramatic cultural disruption" occurred, evidenced by the sudden collapse of the *Olivella* saucer bead trade network. During the *Initial Late Period* (*Lower Emergent*; 950 to 450 B.P.), social

complexity developed toward lifestyles of large, central villages with resident political leaders and specialized activity sites. Artifacts associated with the period include the bow and arrow, small corner-notched projectile points, and a diversity of beads and ornaments (Milliken et al. 2007).

Prehistoric artifacts and sites that have survived to be discovered during historic times represent only a portion of the past. The early growth of San Francisco was characterized by filling of the shallow Bay waters and other low-lying lands, removal of hills of sand and rock, and the obscuring of original ground surfaces by fill, roadways, buildings, and structures. Nels C. Nelson conducted a systematic survey around the perimeter of the entire San Francisco Bay between 1906 and 1909, focusing on mounds of shell partially submerged or adjacent to the Bay waters. He recorded 425 shellmounds, and yet his survey occurred well after Yerba Buena Cove had been filled and the area heavily developed and covered by the built environment (Nelson 1909). It is likely that the filling of the cove and subsequent development obscured any indigenous occupations that may have existed there. The western neighborhoods of San Francisco (i.e., the Richmond, Golden Gate Heights, Sunset, and Parkside districts) have not yet yielded archeological resources from indigenous occupations, but it is not clear whether this is a reflection of past settlement preferences, lack of systematic archeological investigation, or a combination of changes of landscape over time that have buried or otherwise obscured resources, together with a lack of construction to depths likely to reveal any such buried resources. As an example of the known archeological site types within the APE, at least ten indigenous sites have been recorded along or near the northern Bay shoreline, including three sites in the Presidio (CA-SFR-6, -26, and -129) and four sites (CA-SFR-23, -29, -30, and -31) along the bluff bordering the Bay along Fisherman's Wharf and Fort Mason.

3.6.3.2 *Ethnographic Context*

San Francisco Peninsula

By circa 2,500 B.P., Ohlone/Costanoan peoples occupied essentially the same territory that they would until Euro-American contact (Moratto 1984). This territory extended from the Carquinez Strait southward to the Sur River and from the Pacific coast eastward to the Diablo Range (Moratto 1984; Kroeber 1925). The San Francisco peninsula was occupied by speakers of Ramaytush or San Francisco Costanoan, one of eight Ohlone/Costanoan Indian languages spoken in California. Costanoan is derived from the Spanish term *Costanos* for "coast people;" however, it does not represent a cohesive ethnic group and is no longer widely used to refer to the people of the region, who generally prefer the name Ohlone. Instead, Costanoan is a linguistic division, grouping eight languages together due to their phonological similarities. Together with the Miwokan languages, Costanoan comprises the Utian Family of languages. In turn, the Utian Family is part of the larger Penutian Linguistic Stock (Levy 1978; Milliken 1995).

The Ohlone, like most aboriginal Californians, possessed no larger socio-political organization than small local tribes comprised of 50 to 500 people (Kroeber 1925; Levy 1978). Groups were generally composed of one or more loosely affiliated villages and associated logistical camps situated within a recognized territory. Leadership was inherited patrilineally, generally passing from father to son, although women could also hold the office (Levy 1978).

The subsistence strategy of the Ohlone peoples revolved around the procuring of wild vegetal and animal foodstuffs. Vegetal products were gathered as they became seasonally available, and then were either consumed or stored for future use. Acorns, if regularly available, were the staple plant food. If a particular group inhabited an area devoid of oaks (e.g., the coast), then seed procurement predominated (Kroeber 1925; Levy 1978).

Fish and mollusks were a significant component of the diet. Salmonids (i.e., steelhead and salmon) were captured during their spawning migrations by hook and line or seine nets. Mussels and abalone were simply pried from the coastal rocks. Kroeber stated that the shellmounds situated around San Francisco Bay are the richest in California, “except perhaps the Santa Barbara Islands,” attesting to the importance of mollusks to aboriginal sustenance in this vicinity. He further noted that it is probable that “the upper layers of nearly all” of the shellmounds within Ohlone territory “must accordingly be ascribed to the Costanoans” (1925).

At the time of early Spanish contacts and the beginnings of missionization, there were approximately 50 politically autonomous Ohlone community groups (Cook 1943a, 1943b). The Yelamu local tribe, no more than 160 individuals, held the tip of the San Francisco peninsula north of San Bruno Mountain, including all of the bayshore locations related to the project. Most Yelamu people were baptized between 1777 and 1784 at Mission Dolores (Milliken et al. 2007). Several local tribes of the San Francisco bayshore moved in their entirety to Mission Dolores. The concentration of people at the mission, coupled with the indigenous people’s lack of immunity to European diseases, caused the tribes to be decimated by common diseases that were generally not fatal to Europeans. It has been estimated that the overall Ohlone population declined from 10,000 or more in 1770 to fewer than 2,000 in 1832 (Levy 1978).

Marin County

The Marin Headlands is located within the ethnographic territory of the Coast Miwok (Barrett 1908; Kelly 1978; Kroeber 1925). *Miwok* refers to the entire language family that was spoken by Coast Miwok, as well as Lake, Valley, and Sierra Miwok. Coast Miwok territory encompassed all of present-day Marin County and parts of Sonoma County, from Duncan’s Point on the coast and eastward to between the Sonoma and Napa rivers. Settlements focused on bays and estuaries or perennial interior watercourses (Kelly 1978).

The Coast Miwok economy was based on fishing, hunting, and gathering, revolving around a seasonal cycle during which people traveled throughout their territory to make use of resources as they became available. Marine foods, including kelp, clams, crabs, and especially fish, were a year-round staple. Acorns were gathered in season and stored for use throughout the year. Tobacco was generously used by most men. Each large village had a tribal leader but there does not appear to have been any self-defined larger organization (Kelly 1978).

Beginning as early as A.D. 1600 the Coast Miwok began to produce and use clamshell disk beads as money (Stewart and Praetzellis 2003). Coast Miwok had a powerful sense for the value of property. Some Coast Miwok villages defended their territory against trespassers. Although land itself was not

considered privately owned, certain food-producing trees as well as hunting, fishing, and clam-digging locations were (Kelly 1978).

Members of the *Huimen* Coast Miwok tribal group, based in Sausalito, were the first Marin peninsula native people to go to Mission Dolores, beginning in 1783 (NPS 2005b). By the mid-1800s Spanish missionization, diseases, raids by Mexican slave traders, and dense immigrant settlement had disrupted Coast Miwok culture, dramatically reduced the population, and displaced the native people from their villages and land-based resources. By the time of California's initial integration into the United States in the late 1840s, the Coast Miwok population had dwindled from approximately 2,000 individuals to one-eighth of its size before European contact (Kelly 1978).

3.6.3.3 Spanish and Mexican Periods, 1769-1848

As a result of the Cabrillo expedition of 1542-1543, the southbound passage of the Manila Galleon along the coast after 1565, and subsequent voyages of exploration by Cermmenho in 1597 and Vizcaino in 1602, the California coastline was familiar to navigators by the end of the 16th century (Donley et al. 1979). Conversely, the interior remained unknown until the 18th century. Initial European exploration of the project vicinity began in 1769 and lasted until 1810. During this period, a number of Spanish expeditions penetrated the territory occupied by the Costanoan peoples and their neighbors. Favorable reports led to the founding of seven missions in the region between 1770 and 1797.

In the spring of 1776, the site of San Francisco was chosen by Juan Batista de Anza for the establishment of a mission and military post. Later that same year, the Mission San Francisco de Asís (also known as Mission Dolores) and Presidio de San Francisco were officially dedicated and Jose Joaquin Moraga (Anza's lieutenant) took formal possession in the name of King Carlos III (Hoover, Rensch, and Rensch 1990).

The Spanish annexation and colonization of Alta California, as manifested in the religious-military mission system, produced profound changes in the cultures of the indigenous people. The missions resettled and concentrated the aboriginal hunter-gatherer population into agricultural communities. No Ohlone villages maintained traditional lifestyles after 1810 (Milliken 1995). Resistance to missionization among the Coast Miwok pushed some tribal members north to join Russian or Pomo communities. Only a small group of unbaptized Coast Miwok remained in a tribal community near Bodega Harbor by 1832 (Milliken 2009).

Jurisdiction over Alta California was established by Mexico in April of 1822. During the Mexican Period (1822-1848), control over this remote area by the central and local Mexican authorities was never strong. The influence of the missions declined after 1834, when the Mexican government enacted secularization. A major factor leading to the disintegration of Mexican control of California was pressure from the United States. This continued friction ultimately led to the Mexican War of 1846-1847. On July 9, 1846, a crew from the sloop-of-war USS *Portsmouth* came ashore and raised the first American flag over San Francisco (Beck and Haase 1974; Hoover, Rensch, and Rensch 1990).

3.6.3.4 American Period, 1848-Present

Background

California became part of the United States as a consequence of the U.S. victory over Mexico in the war. The territory was formally ceded in the treaty of Guadalupe Hidalgo in 1848 and was admitted as a state in 1850 (Beck and Haase 1974).

Prior to the discovery of gold at Sutter's Mill on January 24, 1848, development in San Francisco consisted of the Spanish/Mexican facilities (i.e., the Presidio and Mission) and a small settlement known as Yerba Buena situated on the shores of the cove by the same name. The inhabitants of Yerba Buena were predominantly non-Spanish, English-speaking immigrants (e.g., U.S. or British citizens). Sometime before the Gold Rush, the inhabitants of Yerba Buena officially changed the name of their settlement to San Francisco. Following the discovery of gold, San Francisco transformed rather quickly from an isolated hamlet into a bustling center of commerce (Hoover, Rensch, and Rensch 1990). According to historic accounts cited by Hupman and Chavez (1995), after the discovery of gold, the population of San Francisco grew from 375 people in 1847 to 2,000 by February 1849, and by the end of 1849, there may have been as many as 20,000 people living in the city.

The APE includes several areas with distinct historical identities and themes that developed following the Gold Rush. These include the military facilities at Fort Mason, the Presidio, and the Marin Headlands (Forts Baker, Barry, and Cronkhite), as well as the federal prison at Alcatraz and recreational facilities at San Francisco Maritime National Historical Park (NHP). The individual histories of these areas are discussed in more detail below.

America's Cup Event Venues and Secondary Viewing Areas

The following provides a brief history of each of the programmed event venues and secondary viewing areas under federal jurisdiction that could be directly or indirectly affected by the various project alternatives. These areas include Crissy Field, the Presidio (bluffs and shoreline overlooking the Golden Gate), the San Francisco Maritime NHP, Fort Mason, Alcatraz Island, Fort Baker, the Marin Headlands, and the Golden Gate Bridge.

Brief History of Crissy Field. The following historical background is condensed from Stephen A. Haller's 1994 historic study of Crissy Field (Haller 1994).

Originally a brackish tidal marsh, the area that is now Crissy Field was once used by local Ohlone inhabitants as an important locale for gathering many types of seafood, tule reeds used in construction of boats, and other key resources. In the middle of the marsh was a stabilized sand dune called Strawberry Island, where a large midden site (CA-SFR-129) has been investigated. The early Spanish and Mexican colonists generally avoided the marshes, so it was not until the American Period that any permanent Euroamerican settlement or development was attempted.

As part of the larger Presidio of San Francisco, a road was completed through the area sometime between 1863 and 1865, and the U.S. Army began to develop the area with wharves and roads by 1870. This development continued with the construction of several warehouses and corrals, but the major

redesign and development of the area began with the infilling of the tidal marsh in preparation for the 1915 San Francisco Panama Pacific International Exposition. Suction dredges pulled sand and mud from the floor of San Francisco Bay, depositing it along the shoreline to create a more stable base for the exposition's facilities.

Following the exposition, the U.S. Army continued to use the now-level field, this time for its air operations. The Crissy Field Air Service Coast Defense Air Station was completed in 1921, and continued to be expanded until 1928. The first paving of the formerly grass runways was completed in 1934. Crissy Field was the only military airfield on the West Coast specifically built as a coast defense air station, and it was the only Army air base in the western U.S. that was active on a continuous basis from 1919 to 1936. Many long-distance flight records were set by pilots departing from or arriving at Crissy Field during this important time in the expansion and technological advancements in aviation.

After the Air Corps closed Crissy Field in 1936, the 30th U.S. Infantry Regiment moved its headquarters to the administration building, and the landing field was increasingly used for a troop assembly area. With the involvement of the U.S. in World War II, temporary mobilization barracks were erected at either end of the air field. The former air mail hangar was used as barracks and classrooms for the top-secret Military Intelligence Language School, a precursor to the Defense Language Institute.

In the post-war years, the Sixth Army Flight Detachment operated light airplanes and helicopters from the paved strip, now called Crissy Army Airfield. Major improvements, including the repaving of the landing mat, were undertaken in 1959. Light planes continued to use the field until 1974, when it was closed to fixed-wing aircraft. A 1999-2000 GGNRA project restored the west end of the field to the 1921 airfield configuration; this area continues to be used as an Army and emergency services helipad. The east end of the field was restored to wetland habitat by the same project. Crissy Field as a whole, and most of its remaining buildings and structures, are listed as contributing elements of the National Historic Landmark District of the Presidio of San Francisco (Haller 1994).

Archeological site CA-SFR-129, believed to be a settlement of the *Petlenuc* subgroup of the *Yemalu* tribe, has been identified as a sensitive resource within the area proposed for programmed AC34 events. Historic architectural resources within Crissy Field that would be subject to effects resulting from the project include the USCG Station ("Golden Gate") near the west end of the beach and the Signal Cable Hut (building 946), a small earthen-covered structure in a grassy picnic area near the west bluff amphitheater. Additionally, the restored airfield itself is a resource that could be subject to impacts, and a partially submerged seaplane ramp is present along the shore at the west end of the beach.

Brief History of the Presidio of San Francisco. The following brief history of the San Francisco Presidio has been excerpted from Erwin Thompson's definitive history of the Presidio, *Defender of the Gate: The Presidio of San Francisco, A History from 1846 to 1995* (1997), and from a history of early Fort Point prepared by NPS historian John Martini (1992).

The three pre-contact sites known in the Presidio (CA-SFR-6, -26, and -129) include a sizable shell midden and human burials, indicating that indigenous peoples used this part of the San Francisco peninsula for extended periods of time (CCSF 2011a). The Presidio of San Francisco is one of the two

earliest Euroamerican settlements in the city's history (the other being the original Mission Dolores). The site was founded in 1776 when Captain Juan Agustin Bautista de Anza formally took possession of the San Francisco headlands, constructed a military camp, and named it the Presidio of San Francisco in honor of St. Francis of Assisi. At the time, this small fortification marked the northernmost extent of Spain's empire in the New World.

Mostly ignored by the Spanish crown and the viceroy of New Spain, the small adobe compound suffered through earthquakes and storms, with repairs and maintenance conducted by the garrison and local Indian laborers as funds allowed. The independence of Mexico in 1821 had little practical effect at the Presidio; the outpost continued largely ignored by the new government as before. Following the annexation of California into the United States, a U.S. Army fort was quickly commissioned at Fort Point, with a second fort proposed one mile north on the Marin County side of the Golden Gate, at Lime Point. Together, the batteries of these two masonry forts would be able to direct a devastating crossfire toward any enemy ships that attempted to enter the Bay (Martini 1992). Fort Point was constructed in 1853-1859, although the partner fort at Lime Point was never built.

The guns of Fort Point were never fired in hostility, and after the occupying Civil War-era garrison left in 1868 it fell into disrepair as masonry forts were being replaced by newer military technology. The obsolete cannons were removed beginning in 1885, with the last guns removed just after the turn of the 20th century (Martini 1992). In place of the fort's defenses, numerous coastal batteries were established on Presidio land and other nearby positions overlooking the Golden Gate.

By 1859, the surveyed boundaries of the Presidio were fenced to keep out squatters, legitimizing and codifying the size and shape of the reserve (Thompson 1997). Presidio troops fought in the Indian Wars of the 1870s, and were key to the defenses of the West Coast during the Spanish-American War, World War I, and World War II. The Presidio was also a staging area for troops heading to various overseas conflicts, and for those appointed to homeland guard duty in national parks. During the 1870s and 1880s, the Presidio served as the headquarters of the Military Division of the Pacific and the Department of California. By the 1920s, this designation as the central command for western U.S. Army forces had become permanent, with the Western Defense Command taking responsibility for the defense of the West Coast during World War II (Thompson 1997).

In 1959, a group of retired military officers and civilian engineers banded together to form the Fort Point Museum Association. Operating with the blessing of the U.S. Army, the association spent the next 11 years raising funds for the preservation of the fort and lobbying for its creation as a National Historic Site. On October 16, 1970, a bill for the creation of the Fort Point National Historic Site was signed into law by former President Richard Nixon. Today, the fort is open to the public and administered by the GGNRA.

The approximately 1,400-acre Presidio was designated the Presidio of San Francisco National Historic Landmark (NHL) District (Presidio Historic District) in 1966 (Thompson 1997). A 1993 NPS update to the NHL set the period of significance at 1776-1945, plus 1951. The most recent update to the NHL nomination form is still in a draft stage and has not yet been adopted (Page & Turnbull 2008); however, it focuses on those elements of the NHL District that have reached significance since the previous (1993) update, including the Cold War era of the Presidio. The revised numbers of

contributing elements from the 2008 update include 582 buildings, 177 structures, 11 sites, and 8 objects. There are also 303 non-contributing elements within the Presidio Historic District boundaries (Page & Turnbull 2008). Management of the Presidio is currently divided between the GGNRA, which oversees the shorefront Area A (including Crissy Field), and the Presidio Trust, a federal agency that has jurisdiction over Area B, which contains a large portion of the NHL District on top of the northern bluffs extending down to Mason Street and westward to Lincoln Boulevard.

The NPS has identified several cultural resources within Area A of the Presidio that may be subject to effects from the AC34 project. These include Battery East, a series of earthen and masonry features originally constructed in 1873 and modified for continued military use through the 1940s (a contributing element of the Presidio Historic District); the Battery Lancaster barracks dump, an archeological site associated with Battery Lancaster (1896-1918); the DeRussey Residence dump, an archeological site of domestic refuse associated with a private house occupied circa 1859-1959; the West San Francisco Batteries (Boutelle, Marcus Miller, and Cranston), active from 1870 to 1943 and listed as contributing elements of the Presidio Historic District; and the Fort Point Seawall, a contributing element of the Fort Point National Historic Site. Additionally, NHL District resources within Area B of the Presidio may be subject to effects from the AC34 project, although these effects are anticipated to be more generalized and related to the introduction of incompatible elements that could affect the integrity of the district as a whole. The permanent buildings and structures within Area B would not be individually vulnerable to the types of spectator-use impacts anticipated with the project.

Brief History of the San Francisco Maritime NHP. The San Francisco Maritime NHP is also referred to as SAFR, and a major component of SAFR is Aquatic Park. A detailed description of this area's history can be found in the Cultural Landscape Report (CLR) completed by the NPS (2010). The following summary is largely derived from this CLR.

Although no indigenous archeological sites have been excavated within SAFR, nearby sites at Fort Mason demonstrate that the original shoreline of the Bay was used by Ohlone groups for many years. One reported site, CA-SFR-23, is believed to exist in the vicinity of the intersection of Hyde and Beach streets, most likely buried underneath several meters of imported fill. Prior to the Gold Rush, a portion of the park was completely submerged beneath the waters of San Francisco Bay. The two most prominent features along the shore were Tonquin Point, a tall, sandy dune jutting out into the Bay roughly along the line of present-day Hyde Street, and the natural headland at Black Point (now Fort Mason). Between the two was a large curving cove.

At least as early as the 1880s, bathers congregated in the cove to enjoy its warm waters—the result of heated industrial discharge from nearby facilities such as the Selby Lead & Smelting Company and Pioneer Woolen Mills. Development intensified in the early years of the 20th century, coinciding with widespread filling activities in the Bay. After the 1906 earthquake and fire, thousands of truckloads of rubble and debris were used to fill areas of the Bay east of Black Point. This dumping, along with proposals for additional fill, resulted in public advocacy for development of a public park at the cove.

In 1918, the San Francisco Board of Supervisors authorized the Board of Public Works to contract for the development of plans and specifications for Aquatic Park. Park construction began in 1931, and Municipal Pier was the first of the Aquatic Park facilities to be completed in 1934. Work on the rest of

Aquatic Park came to a halt due to lack of funds until the creation of the Works Progress Administration (WPA) in 1935. Aquatic Park was one of the largest WPA projects and was mostly completed between 1936 and 1939. The Streamline Moderne design for Aquatic Park included several buildings and structures as well as landscape features: the Bathhouse with flanking amphitheater structures, two speaker towers, roundhouse “convenience stations” (one with a concessions stand), a seawall, the Promenade, and Municipal Pier. In 1951, the Aquatic Park Bathhouse building, which already housed the San Francisco Senior Center, became home to the San Francisco Maritime Museum (NPS 2010).

The Hyde Street ferry terminal became the site of a maritime state park in the late 1950s, and then, along with Aquatic Park, Victorian Park, and the Haslett Warehouse (Argonaut Hotel), became the heart of the Maritime Unit of the Golden Gate National Recreation Area in 1977-1978. The Maritime Unit became the San Francisco Maritime NHP in 1988. The resources of San Francisco Maritime NHP include five National Historic Landmark vessels berthed at the Hyde Street Pier, located at the east end of the park: 1886 square-rigger *Balclutha*, 1890 steam ferryboat *Eureka*, 1891 scow schooner *Alma*, 1895 schooner *C.A. Thayer*, and 1907 steam tug *Hercules*. These vessels dock along the Hyde Street Pier at the eastern end of the San Francisco Maritime NHP. The Aquatic Park NHL District, a designed landscape, encompasses much of the San Francisco Maritime NHP, including the cove and 10 acres of land with three buildings and five contributing structures. This same geographical area is also listed as a National Register Historic District, with the same number of contributing elements as the National Landmark District described above. The Aquatic Park Cultural Landscape encompasses an area slightly larger than the NHL District, although the Bocce Courts and Victorian Park do not contribute to its significance.

Sensitive cultural resources that could potentially be affected by use of the proposed AC34 event venues and expected spectator viewing areas within SAFR include Municipal Pier and the historic vessels on the Hyde Street Pier, as well as the east and west roundhouses and the grass, trees, and shrubs of the Aquatic Park Cultural Landscape.

Brief History of Fort Mason. The following discussion of Fort Mason is generally condensed from the GGNRA’s CLR, prepared in 2004 by NPS Pacific West Region and the Olmsted Center for Landscape Preservation.

At least three Late Holocene archeological sites (CA-SFR-29, -30, and -31) have been identified within Fort Mason. Investigations at these sites show that indigenous inhabitants were drawn to the bluffs overlooking the natural shoreline, using the area as a base for food procurement/processing and possibly seasonal or intermittent habitation. Black Point served as a strategic Spanish (1794–1821), then Mexican (1821–1848) military post until California was ceded to the United States in 1848. This area was recognized early for its military potential and was reserved for military use almost immediately after California achieved statehood. Civil War-era gun batteries were constructed over earlier Spanish fortifications in the northern point of the upland plateau. Honoring Colonel Richard Barnes Mason, the post was renamed “Fort Mason” in 1882 (NPS 2004).

In the 1890s, upgrading to new weapon technologies, the military installed a series of high-powered artillery (Battery Burnham) at the mouth of the Bay. However, Fort Mason’s more easterly position rendered it less important for this type of defense and its posts were some of the first to be abandoned.

After the 1906 earthquake, the grounds of Fort Mason were used to temporarily house some of the city's displaced inhabitants. Nearly 10 years later, these same grounds were adopted by the Panama Pacific International Exposition. World Wars I and II saw some military activity at the fort; however, with the advent of new transportation technologies, the military importance of the fort waned. In 1972, Fort Mason was transferred to the NPS, and it continues to be run by the NPS today.

Fort Mason includes a National Register Historic District and a National Historic Landmark District (San Francisco Port of Embarkation, U.S. Army NHL District), as well as a Cultural Landscape. The National Register Historic District encompasses 68.5 acres of Upper and Lower Fort Mason, including 45 buildings, 10 structures, and two objects as contributing elements. The San Francisco Port of Embarkation, U.S. Army NHL District is a discontinuous district that encompasses 21 acres within Upper and Lower Fort Mason, including 13 contributing buildings and five contributing structures. The Fort Mason Cultural Landscape includes many features of both Upper and Lower Fort Mason, with boundaries equal to the National Register Historic District.

Several cultural resources within Fort Mason have been identified as sensitive to the potential effects of the AC34 project. These include Piers 2 and 3 of Lower Fort Mason, an indigenous archeological site (CA-SFR-31), the Black Point/Point San Jose Batteries (earthen, brick, and timber structures dating to 1864), the Northwest Embankment (an engineered slope with historic stairs and foundations below the Great Meadow), the 1890 Parade Grounds, and a series of 19th-century pathways and stone retaining walls overlooking Aquatic Park (East Black Point Trails).

Brief History of Alcatraz Island. The following summary of the history of Alcatraz is condensed from the GGNRA's Cultural Landscapes Inventory (NPS 2005a).

The windy, fog-shrouded island of Alcatraz appears to have been used little, if at all, by Ohlone and Coast Miwok peoples prior to European exploration of San Francisco Bay. The island was initially regarded as of little value by Spanish and subsequent Mexican leaders. Following the signing of the Treaty of Guadalupe Hidalgo in 1848, the United States government declared the island federal property. During the height of the Gold Rush, the vast numbers of ships arriving in San Francisco Bay emphasized the need for navigation aids, and the first lighthouse on the West Coast was placed into operation on the south side of the island in 1854.

A federal military prison was first established on the island in 1861. Civil War and Spanish-American War prisoners were housed for years in "temporary" wooden buildings. By 1903 the Army needed a modern, permanent military prison and was considering sites, including Alcatraz, in the Bay Area (Thompson 1979). On March 21, 1907, Alcatraz was redesignated the Pacific Branch, U.S. Military Prison, Alcatraz Island. Old wood frame residences and support buildings were replaced by "concrete structures of a harmonious architectural style" (Martini 1990). New buildings included the new lighthouse (1909), new cellhouse (1912), Post Exchange (1910), Quartermaster Waterhouse and Powerhouse (1912), Commandant's House (1921), and Model Industry's Building (early 1920s). When completed, the cellhouse was the largest reinforced concrete building in the world.

In 1933, Alcatraz was transferred, in an initial five-year lease, to the Federal Bureau of Prisons. As a federal prison, it housed some of America's most dangerous criminals, those who were believed to be

too unmanageable for incarceration in other facilities. Its location in the Bay rendered Alcatraz nearly escape-proof (Haller 1985).

In 1961, an engineering survey of the island's facilities found that the buildings "were dangerously deteriorated and that \$5,000,000 would be required to repair and rebuild them" (Thompson 1979). The federal prison operations at Alcatraz were closed on March 21, 1963 (Thompson 1979).

For the five years following the closure of the federal prison on Alcatraz in March 1963, the island was vacant except for federal security personnel. During this period, a group of Native Americans were pursuing claims to the island that would evolve into the 19-month Indian Occupation from 1970 to 1971 (Johnson 1997).

In May 1971, the U.S. General Services Administration announced that it planned to transfer Alcatraz to the Department of the Interior (Thompson 1979). In 1972, the GGNRA was created, and Alcatraz was added to the properties included in the park. The island was opened by the NPS for public tours beginning in October 1973.

Alcatraz Island was listed in the National Register in 1976 and was designated a National Historic Landmark in 1986. Because of its isolation and strictly controlled access, the built environment on Alcatraz retains excellent integrity. There are 18 individual buildings and 28 structures listed as contributing elements of the Alcatraz Island Historic District; this includes virtually all built elements on the island. Only the minor post-1973 NPS-installed visitor facilities (restrooms, signs, fences, etc.) do not contribute to the historic district.

Brief History of Fort Baker. The following historical background is primarily condensed from the Fort Baker CLR (NPS 2005b).

Although evidence of indigenous occupation of the immediate Cavallo Point area has not been identified, sites have been investigated approximately 1 mile to the north in and around Sausalito. A 1775 Spanish account of a mapping expedition of the Bay mentions a Coast Miwok village ("Anamás") that could be near Horseshoe Bay, although archeological evidence of such a village has not yet been confirmed (NPS 2005b).

Spanish colonists did not settle on the north shore of the Golden Gate, although a Mexican land grant including this region was deeded to English-born William Richardson in 1838. In the 1850s, President Millard Fillmore designated 1,899 acres on the north side of San Francisco Bay, including Cavallo Point, as the Lime Point Military Reservation. After 16 years of ownership disputes with Richardson's successors, the federal government acquired the land. Once under Army control, construction began on several batteries along the southern Marin County shoreline and low bluffs, including Battery Cavallo. A steam-powered fog signal station was constructed in 1883 at the base of Lime Point, with a signal light added in 1900. Operation of this station was taken over by the USCG in 1939, and the station was automated in 1961. Beginning in the 1890s, the Army began a program to reconstruct all major coastal fortifications, including those in San Francisco Bay. Massive reinforced concrete batteries were constructed along both sides of the Golden Gate. Fort Baker was established in 1898, and by 1905, the Army had completed Batteries Duncan and Yates to supplement the fort's defenses.

Most of the guns were removed during World War I and the post reverted to caretaker status in the interwar years. During World War II, the facilities at Fort Baker served as a mine depot, storage buildings, and ammo bunkers for coastal defense. Also during World War II, new structures and facilities were developed along the waterfront of Horseshoe Bay and the site was used as a temporary hospital. Coastal defense activities at Fort Baker ended in 1949.

In 1972, Congress established the GGNRA. All of the former Lime Point Military Reservation was included within the authorized boundaries of this newly designated park. The following year, Fort Baker was listed in the National Register as part of the "Forts Baker, Barry and Cronkhite Historic District" (1973). The NPS took over management of the open space throughout the Marin Headlands while the Army maintained and administered the developed area of Fort Baker. Beginning in 1985, and in phases over the next 15 years, the Army transferred jurisdiction of portions of the Fort Baker Military Reservation to the NPS. In 1988, the USCG constructed new facilities for its Station Golden Gate at Horseshoe Bay. Also during this period, the Bay Area Discovery Museum opened, occupying several historic buildings in the former warehouse area of the post. In August 2002, the Army relinquished its remaining holdings at Fort Baker to the NPS. Today, in addition to the Coast Guard station and the Bay Area Discovery Museum, the site encompasses 335 acres and contains more than 100 historic elements including 47 significant military residential and administrative buildings, historic roads, landscape resources, numerous utilitarian structures, and seven fortification batteries from the late 19th and early 20th century development of the site. Many of the historic buildings were recently restored and rehabilitated to become Cavallo Point, a resort hotel, restaurant, and conference center managed by a concessionaire for the NPS (NPS 2005b).

Although only the Fort Baker Mine Wharf (Pier at Cavallo Point) is included in programmed event venues for the AC34 project, additional parts of the Cavallo Point promontory would be subject to use as a secondary viewing location. Cultural resources in this area that could be sensitive to such uses include Batteries Duncan (1898-1917), Cavallo (1872-1905), and Yates (1903-1942), as well as Lime Point, the Yellow Bluff/East Fort Baker dump (CA-MRN-649H), and a series of military structures above Battery Duncan (Lateral Fire Site). The three batteries and the Lime Point fog signal station are each contributing elements of the Forts Baker, Barry, and Cronkhite National Historic District. The Yellow Bluff dump and the Lateral Fire Site north of Battery Duncan (two keyhole-shaped bunkers constructed of concrete "sandbags," and a concrete searchlight mount) date to the early 1940s. While these resources are not currently listed as contributing features of the historic district, they are considered by the NPS to be contributing resources.

Brief History of the Marin Headlands. The following historical background is primarily condensed from the Historic Resource Study for Forts Baker, Barry, and Cronkhite (Thompson 1979) and the CLR prepared for the historic district encompassing the same areas (NPS 2005b).

At the time of Spanish contact, the Marin County bayshore was in the territory of the *Huimen* tribal group of Coast Miwok. At least three *Huimen* villages were mentioned by a 1775 Spanish mapping expedition, although the location of only one of these has been confirmed (NPS 2005b).

No permanent settlements were established in the area until the realization of the federal Lime Point Military Reservation in 1867. Between 1868 and 1869, nearly 1 million cubic yards of rock were blasted

away from the high scarp overlooking the Golden Gate to form a nearly sea-level foundation platform for a proposed fort at Lime Point. By the time this was completed, however, it had finally been accepted by the Pacific Board of Engineers that a masonry fort was not the best use of the site, and no construction took place on the excavated platform. Instead, a series of batteries was proposed along the headlands from Point Bonita to Cavallo Point (NPS 2005b).

In 1870, construction foreman George Mendell began the task of constructing roads between the proposed batteries, some of which are still in use within the GGNRA as hiking and bicycle trails. Those batteries that were completed by Mendell included Gravelly Beach Battery (replaced by Battery Kirby in the 1890s), Ridge Battery, Cliff Battery (later replaced by Battery Spencer), and Cavallo Battery. All work on these batteries and supporting infrastructure halted in 1876, when funding for coastal defenses was withdrawn by Congress (NPS 2005b).

By 1890, renewed interest in defensive fortifications around San Francisco Bay resulted in proposals for new batteries along the Marin Headlands. Under these plans, batteries were constructed from Lime Point east to Cavallo Point (Batteries Spencer, Kirby, Duncan, Orlando Wagner, and George Yates) and from Lime Point west to Point Bonita (Batteries Mendell, Alexander, Edwin Guthrie, Patrick O'Rorke, and Samuel Rathbone). Construction on these new fortifications began in 1893, and soon it became apparent that a permanent garrison would be needed to maintain and man the Marin County batteries. Fort Baker was established for this purpose in 1898, with a small contingent sent to Point Bonita at what would become Fort Barry in 1903. Over the next decade or so, military prisoners from Alcatraz provided much of the labor for constructing permanent facilities at these forts (NPS 2005b).

Additions to the batteries of the Lime Point Military Reservation were made during the first half of the 20th century, in accordance with the changing technology of the era. The bombing of Pearl Harbor in December 1941 caused a renewed interest in the Marin Headlands forts, and new searchlights, surveillance radar, and antiaircraft guns were quickly emplaced. By the end of the 1940s, however, most of the batteries had been disarmed and abandoned as obsolete.

Forts Barry and Baker are both listed in the National Register of Historic Places, along with the various batteries along the southern headlands, as part of the "Forts Baker, Barry and Cronkhite Historic District," administered by the GGNRA (NPS 2005b).

Sensitive cultural resources present within the Marin Headlands that could be indirectly affected by AC34 events include four brick gun emplacements and a brick powerhouse at Ridge Battery (1870-1901), the buildings and structures of Battery Spencer (1893-1943), Battery Wagner (1901-1917), and Battery Kirby/ Gravelly Beach (1870-1941). Features associated with each of these batteries are listed as contributing elements of the Forts Baker, Barry, and Cronkhite Historic District. Additional sensitive resources include an unfinished battery at Hawk Hill (Battery Construction Number 129, also a contributing element of the historic district), and military features (a fire control station and cistern) at Slacker Hill dating to the early 1940s that are considered (but not listed as) contributing elements of the historic district.

Brief History of the Golden Gate Bridge. The following historical background is condensed from information on the Golden Gate Bridge, Highway, and Transportation Department's (GGBHTD) website.

Although private ferry service across the Golden Gate was available as early as 1850, a bridge connecting the San Francisco peninsula with Marin County was envisioned for nearly a century before construction of such a bridge actually began. In 1923, the State Legislature passed the Golden Gate Bridge and Highway District Act, setting in motion the funding, design and construction of what would become perhaps the most famous symbol of San Francisco.

The Golden Gate Bridge and Highway District (later expanded with the word “Transportation” to include public transit and ferry service) was officially established as a public agency in December 1928, and construction of the bridge began more than four years later on January 5, 1933. Stretching from Fort Point across the narrows of the Golden Gate to Lime Point, the bridge took more than four years to complete, at a cost of approximately \$35 million. Ten different primary contractors and dozens of subcontractors worked on the footings, towers, decking, and cables of what was at the time the longest suspension bridge in the world. Use of hard hats, a safety net, and other construction innovations kept the accident rate relatively low for a project of the bridge’s magnitude at that time; the safety net is credited with saving 19 lives. However, a scaffolding collapse a few months before bridge completion killed ten men, and one earlier fatality brought the total number of workers killed during construction to 11. Painted “International Orange” for better visibility in the area’s frequent fog, the bridge opened to pedestrians on May 27, 1937, and to vehicle traffic the next day (GGBHTD 2011).

The American Society of Civil Engineers declared the bridge a California Historic Civil Engineering Landmark in 1976 and a National Historic Civil Engineering Landmark in 1984. The Golden Gate Bridge is California Historical Landmark No. 974 and San Francisco Landmark No. 222, has been determined eligible for the NRHP, and is likely eligible for listing as a NHL. The bridge is owned and managed by the GGBHTD.

3.6.4 Potentially Affected Resources

Each of the programmed event venues and secondary viewing locations described above contain cultural resources subject to effects from the AC34 events. Table CUL-1 summarizes those specific potentially affected resources under federal jurisdiction within the APE in each of the above event venue or secondary viewing locations. While there are many cultural resources within the APE, those listed in Table CUL-1 have been identified by the appropriate federal agency as being subject to the types of effects anticipated as a result of the AC34 project. More generalized areas in several of the programmed event venues that coincide with federally listed historic districts would also be subject to certain types of effects. These include portions of the Presidio of San Francisco NHL District in Crissy Field and Areas A and B of the Presidio; the Fort Mason National Register Historic District (and Cultural Landscape) and San Francisco Port of Embarkation, U.S. Army NHL District; the Aquatic Park NHL/National Register District and Cultural Landscape; and the Forts Baker, Barry, and Cronkhite Historic District. Additional resources within the APE that are not under federal jurisdiction have been identified, and potential impacts addressed, in the EIR for the AC34 and James R. Herman Cruise Ship Terminal and Northeast Wharf Plaza (ESA 2011).

TABLE CUL-1: CULTURAL RESOURCES ON FEDERALLY MANAGED LANDS POTENTIALLY AFFECTED BY AC34 ALTERNATIVES

Venue/ Secondary Viewing Area Cultural Resource of Concern	Age/ Period of Significance	Description	Contributing Element of Listed District?
Crissy Field			
Archeological site CA-SFR-129	~A.D. 1375-1700	Late Period shell midden and artifacts	No, but likely NRHP-eligible under Criterion D
USCG Station Golden Gate	1889-1945	Original 1889 station house (keeper's quarters), replacement 1915 station house, 1920 boat house	Presidio of San Francisco NHL District
Signal Cable Hut	Constructed 1921	Small concrete gun mount with earthen bunker	Presidio of San Francisco NHL District
Airfield	1921-1936	Grassy field in original 1921 configuration	Presidio of San Francisco NHL District
Seaplane ramp	1921-1936	Partially submerged concrete ramp	Presidio of San Francisco NHL District
Presidio (Area A)			
Battery East	1873-1940s	Earthen and masonry features (traverses, magazines)	Presidio of San Francisco NHL District
Battery Lancaster barracks dump	1896-1918	Domestic/military refuse	Presidio of San Francisco NHL District
DeRussey Residence dump	1859-1959	Glass and ceramic fragments	Presidio of San Francisco NHL District
Fort Point Seawall	1850-1949	Granite seawall	Fort Point National Historic Site, Presidio of San Francisco NHL District
West San Francisco Batteries (Boutelle, Marcus Miller, and Cranston)	1870-1943	Earthen and concrete fortifications and a battery road	Presidio of San Francisco NHL District
Presidio (Area B)			
Presidio of San Francisco NHL District (general)	1776-1945, 1951*	Various buildings, structures, objects, sites, and cultural landscape features of the NHL District	Presidio of San Francisco NHL District
San Francisco Maritime NHP			
Municipal Pier	1936-1945	Pier structure	Aquatic Park NHL District/National Register Historic District
Hyde Street Pier historic fleet	1886-1907	5 vessels (<i>Balclutha</i> , <i>Eureka</i> , <i>Alma</i> , <i>Thayer</i> , and <i>Hercules</i>)	National Historic Landmark Vessels of the San Francisco Maritime National Historical Park
East and West Roundhouses	1939-1945	Former "convenience stations"	Aquatic Park NHL District/National Register Historic District
Trees, shrubs, grass, and other plantings of the Aquatic Park Cultural Landscape	1920-1945	Trees, shrubs, flower beds, and turf in plantings dating to the period of significance	Aquatic Park Cultural Landscape

TABLE CUL-1: CULTURAL RESOURCES ON FEDERALLY MANAGED LANDS POTENTIALLY AFFECTED BY AC34 ALTERNATIVES (CONTINUED)

Venue/ Secondary Viewing Area Cultural Resource of Concern	Age/ Period of Significance	Description	Contributing Element of Listed District?
Fort Mason			
Archeological site CA-SFR-31	~A.D. 600-900	Upper Middle Period shell midden and artifacts	No, but determined NRHP-eligible under Criterion D
East Black Point Trails	1855-1953	Pathways and stone retaining walls with built-in seats	Fort Mason Cultural Landscape
Black Point/Point San Jose Batteries (Battery West and Battery East)	1864-World War II	Earthen/masonry Battery West and connecting wall; archeological remains of Battery East are possible. Also a concrete gun platform c. 1920	Fort Mason National Register Historic District
Northwest Embankment	1855-1953	Engineered grassy embankment with Monterey Cypress, two sets of concrete stairs, and two concrete foundations	Fort Mason Cultural Landscape
Parade Ground	1890-1929	Open turf surrounded by historic buildings and roadways	Fort Mason National Register Historic District
Piers 2 and 3, Lower Fort Mason	1912-1945	Pier structures	Fort Mason National Register Historic District and San Francisco Port of Embarkation, U.S. Army NHL District
Alcatraz Island			
Cellhouse	1854-1963	Interior historic materials of cellhouse	Alcatraz Island Historic District / Alcatraz National Historic Landmark
Fort Baker			
Fort Baker Pier (Mine Wharf)	1937	Pier structure	Forts Baker, Barry and Cronkhite Historic District
Battery Duncan	1898-1917	Concrete and earthen battery structures	Forts Baker, Barry and Cronkhite National Historic District
North of Battery Duncan (Lateral Fire Site)	1940s	A concrete searchlight mount and two keyhole-shaped sandbag bunkers	Considered a contributing element of the Forts Baker, Barry and Cronkhite National Historic District
Battery Cavallo	1872-1905	Masonry and earthen battery structures	Forts Baker, Barry and Cronkhite National Historic District
Battery Yates	1903-1942	Concrete battery structures	Forts Baker, Barry and Cronkhite National Historic District

TABLE CUL-1: CULTURAL RESOURCES ON FEDERALLY MANAGED LANDS POTENTIALLY AFFECTED BY AC34 ALTERNATIVES (CONTINUED)

Venue/ Secondary Viewing Area Cultural Resource of Concern	Age/ Period of Significance	Description	Contributing Element of Listed District?
Fort Baker (cont.)			
Lime Point	1883	Fog signal station building	Forts Baker, Barry and Cronkhite National Historic District
Yellow Bluff/East Fort Baker dump	1940s	Refuse (ceramic, glass, metal, slate, brick, and rubber fragments) likely related to the U.S. Army Hospital and/or Quartermaster Corps	Considered a contributing element of the Forts Baker, Barry and Cronkhite National Historic District
Marin Headlands			
Battery Spencer	1893-1943	Concrete buildings, a gate, three gun mounts, and two fire control stations	Forts Baker, Barry and Cronkhite National Historic District
Ridge Battery	1870-1901	Former powerhouse, brick gun emplacements, and earthworks	Forts Baker, Barry and Cronkhite National Historic District
Slacker Hill military features (fire control station and cistern)	1941-1945	Emergency helipad area and concrete gun mount	Considered a contributing element of the Forts Baker, Barry and Cronkhite National Historic District
Battery Orlando Wagner	1901-1917	Two concrete gun emplacements and related buildings/structures	Forts Baker, Barry and Cronkhite National Historic District
Battery Kirby/Gravelly Beach	1870-1941	Concrete gun mounts and a magazine	Forts Baker, Barry and Cronkhite National Historic District
Hawk Hill (Battery Construction Number 129)	1942-1944	Unfinished concrete gun mounts and fire control station	Forts Baker, Barry and Cronkhite National Historic District
Golden Gate Bridge			
Golden Gate Bridge	1937	Bridge structure and footings	Determined eligible for NRHP and considered eligible for NHL. Individually listed as National and California Historic Civil Engineering Landmark, California Historical Landmark, and San Francisco Landmark
NOTES:			
* Additional dates of significance for the Presidio of San Francisco NHL District are under review (Page & Turnbull, 2008) All information from Table CUL-1 was gathered in consultation with the National Park Service in 2012.			
SOURCE: ESA, 2012.			

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3.7 VISITOR USE AND EXPERIENCE

This section provides a summary of the visitor use and experience resources under federal jurisdiction that could be affected by the various events or structural components associated with the proposed 34th America's Cup (AC34) project. Existing visitor use and experience resources in the project area and vicinity are shown in **Figure VUE-1** and are listed in **Table VUE-1**. Regional visitor use and experience resources are described as federally owned and managed facilities, including recreational and open space uses owned and managed by the Golden Gate National Recreation Area (GGNRA) and the San Francisco Maritime National Historical Park (SAFR), which are designated by the U.S. Department of the Interior and administered by the National Park Service (NPS), as well as land areas with trails, recreational facilities and programs managed by the Presidio Trust within GGNRA's broader boundaries. In addition, use of offshore areas under the jurisdiction of the U.S. Coast Guard is described. The visitor use and experience resources are described by the following geographic areas.

3.7.1 Visitor Services, Amenities, and Recreation Activities

3.7.1.1 National Park Service, San Francisco Maritime National Historical Park

The San Francisco Maritime National Historical Park includes a fleet of historic vessels along the Hyde Street Pier, a visitor center (within the Argonaut Hotel), man-made lagoon, gardens, a maritime museum, and a library/research facility, Sea Scout Base, among other recreational opportunities. This park also incorporates the Aquatic Park Historic District, which is bounded by Van Ness Avenue, Beach Street, and Hyde Street. Aquatic Park generally includes the San Francisco Maritime Museum and stadia, Municipal Pier, Victorian Park, speaker towers, beach, Aquatic Park Promenade/Bay Trail, and retaining walls.

The San Francisco Maritime Museum is a key structure of the Aquatic Park Historic District and currently houses exhibit space. North of the Maritime Museum is a sandy beach and man-made lagoon that is used for swimming and boating. The beach and adjacent cobblestone steps are a popular recreational area for beach activities and picnicking. As described below, Aquatic Park is also widely used for canoeing and kayaking by the South End Rowing Club and the Dolphin Swim Club. The nearby bleachers commonly serve as an assembly site and are used as a viewing area for groups and individuals.

West of the lagoon is the horseshoe-shaped Municipal Pier, which is commonly used for fishing and provides scenic viewing opportunities of the Bay. The Sea Scout Base, located near the terminus of Van Ness Avenue, hosts sailing programs for high school-aged youth. South of the lagoon and beach is a concrete seawall and a grassy area known as Victorian Park, which contains the Hyde Street cable turnaround. The park also includes bocce ball courts located west of the museum and grassy area, which are used by a bocce ball club.

At the eastern boundary of the lagoon, the NPS leases the Hyde Street Pier from the Port of San Francisco for exhibition of historic ships and maritime historical artifacts and educational programs. Some of the historic ships are available for self-guided or docent-led tours operated by San Francisco Maritime National Historical Park's non-profit partner, the San Francisco Maritime National Park

TABLE VUE-1: VISITOR USE AND EXPERIENCE RESOURCES IN THE PROJECT VICINITY

Resource	Location	Activities/Facilities	Land Owner, Regulator, or Land Manager
Visitor Use and Experience Facilities in the Vicinity of Proposed Spectator Venues			
Fort Baker, Marin County			
Cavallo Point Lodge	Eastern point of Horseshoe Bay	Accessible via pedestrian and bicycle path; parking available.	Golden Gate National Recreation Area
Bay Area Discovery Museum	557 McReynolds Road, Sausalito	Educational museum for young children.	Golden Gate National Recreation Area
Travis Sailing Center	East side of Horseshoe Bay	Provides sailing lessons and boat rentals.	Golden Gate National Recreation Area
Alcatraz Island			
Alcatraz Island	Central San Francisco Bay, offshore of Fisherman's Wharf	Major museum exhibit attraction, lighthouse, guided tours, trails.	Golden Gate National Recreation Area
San Francisco Maritime National Historical Park			
Aquatic Park Cove and Beach	West of Hyde Street Pier and east of Van Ness Avenue and Municipal Pier	Beach activities, picnicking; popular place for swimming, kayaking, and boating. Widely used by the South End Rowing Club and Dolphin Club.	San Francisco Maritime National Historical Park
San Francisco Maritime Museum	Beach Street and Polk Street	Houses exhibit space and is decorated with colorful murals. Originally built as a bathhouse for 5,000 people in the mid-to late 1930s, this concrete structure is a major focal point of the Aquatic Park Historic Landmark District.	San Francisco Maritime National Historical Park
Hyde Street Pier	At the terminus of Jefferson Street and just east of Aquatic Park Cove.	Historic ferry pier that hosts various historical ships, some of which are available for self-guided or docent-led tours. Ships on display include the <i>Balclutha</i> , <i>C.A. Thayer</i> , <i>Eureka</i> , <i>Alma</i> , <i>Hercules</i> , and <i>Eppleton Hall</i> .	San Francisco Maritime National Historical Park
Visitor Center/Argonaut Hotel	Hyde Street and Jefferson Street	The Argonaut Hotel is partnered with the SAFR and includes 252 guest rooms. The visitor center offers programs designed for children, programs about lighthouses and lifesaving, films, and information about walking tours offered within the park.	San Francisco Maritime National Historical Park
Victorian Park	Bordered by Van Ness Avenue to the west, Beach Street to the south, Hyde Street to the east and Aquatic Park Cove to the north.	Grassy lawns, bench seating and paved paths.	San Francisco Maritime National Historical Park
Bocce Ball Courts	Terminus of Beach Street and Van Ness Avenue.	Two formal bocce ball courts and one informal court.	San Francisco Maritime National Historical Park
South End Rowing Club and Dolphin Club	500 and 502 Jefferson Street (southeast portion of Aquatic Park)	Buildings are leased to the two clubs and include storage for rowboats and kayaks, locker rooms, restrooms, lounge areas, and a weight room.	San Francisco Recreation and Parks Department and Port of San Francisco

TABLE VUE-1: VISITOR USE AND EXPERIENCE RESOURCES IN THE PROJECT VICINITY (CONTINUED)

Resource	Location	Activities/Facilities	Land Owner, Regulator, or Land Manager
Visitor Use and Experience Facilities in the Vicinity of Proposed Spectator Venues (cont.)			
<i>San Francisco Maritime National Historical Park (cont.)</i>			
South End Rowing Club and Dolphin Club (cont.)		Club members swim in the waters of Aquatic Park, row in the Bay, play in handball tournaments, and participate in annual triathlons such as Escape from Alcatraz. ^a	
San Francisco Sea Scout Base	At the foot of Van Ness Avenue in Aquatic Park	Hosts the Sea Scout Ships Corsair and Viking for high-school aged youth in San Francisco. These programs focus on sailing traditional whaleboats; members also learn about boat maintenance, piloting, safety and other maritime skills. ^b	San Francisco Maritime National Historical Park
<i>Promenade/Bay Trail and Associated Key Trail Connections</i>			
Crissy Field Promenade/ Bay Trail	Paved promenade that runs through Fisherman’s Wharf, Jefferson Street, Aquatic Park, Fort Mason, Marina Green, and Crissy Field, Fort Point and ends at the Golden Gate Bridge. Other associated trails connect East Road to Fort Baker and Alexander Avenue to Sausalito	An approximately 4.3-mile-long multiuse trail that runs the length of Crissy Field and is accessible to bicyclists and hikers. This trail is a small portion of the larger Bay Trail, a 500-mile network of trails that will encircle San Francisco and San Pablo Bays. The Crissy Field Promenade/Bay Trail is regularly used by Galileo High School physical education classes.	San Francisco Maritime National Historical Park manages the approximately 1-mile portion that connects the Maritime Library at Fort Mason to the Hyde Street Pier and Fisherman’s Wharf. Golden Gate National Recreation Area manages the remaining portion along Crissy Field (3.3 miles).
Aquatic Park Promenade	Segment of the Bay Trail that runs through Fisherman’s Wharf and Fort Mason	Major San Francisco Bay waterfront multiuse trail	San Francisco Maritime National Historical Park
Trail connection	Fort Mason at Laguna Street	Major San Francisco Bay waterfront trail connection for hikers and bikers to Marina Green or Crissy Field and Golden Gate Bridge.	Golden Gate National Recreation Area
Marina Green Trail	Segment of the Bay Trail between Fort Mason and Crissy Field, on the north sidewalk of Marina Boulevard between Laguna and Lyon Streets.	One of the most heavily used parts of the Bay Trail, this segment serves thousands of residents, commuters and tourists on a daily basis.	Golden Gate National Recreation Area
Crissy Field Promenade -	Waterfront trail between Marina Green and Fort Point and connecting East Beach to West Bluff. Constructed out of decomposed granite material.	Major scenic NPS multi-purpose trail spanning the San Francisco Bay waterfront along Crissy Field.	Golden Gate National Recreation Area

TABLE VUE-1: VISITOR USE AND EXPERIENCE RESOURCES IN THE PROJECT VICINITY (CONTINUED)

Resource	Location	Activities/Facilities	Land Owner, Regulator, or Land Manager
Visitor Use And Experience Facilities in the Vicinity of Proposed Spectator Venues (cont.)			
<i>Promenade/Bay Trail and Associated Key Trail Connections (cont.)</i>			
Presidio Segment of the California Coastal Trail	Connects Baker Beach to Golden Gate Bridge and newly constructed Golden Gate Overlook on the south side of the bridge	Extends through Baker beach and coastal bluffs, and features views of batteries scattered throughout the bluffs.	Golden Gate National Recreation Area
Golden Gate Bridge	Paths extending along both sides of the Golden Gate Bridge	Bridge paths feature separate paths for bikes and pedestrians.	Golden Gate Bridge, Highway and Transportation District
Vista Point trail	Extends from Vista Point (northeast of Golden Gate Bridge) to Fort Baker	Unimproved hiking trail.	Golden Gate National Recreation Area
<i>Fort Mason</i>			
Upper Fort Mason	Generally bounded by Laguna Street to the west, Bay Street to the south, Van Ness Avenue to the east, and the Bay Trail to the north	Includes the Great Meadow, GGNRA headquarters offices, youth hostel, hiking and biking trails (including the Bay Trail), open space parks and gardens, picnic areas and historic buildings. The Great Meadow is commonly used for picnicking, music concerts and large sporting events.	Golden Gate National Recreation Area
Lower Fort Mason	Northeast of the Marina Boulevard and Laguna Street intersection	Includes the SAFR headquarters, public research library and museum collections, parking, picnic areas, and the Fort Mason Center. Fort Mason Center is used to host various events and programs such as farmers markets, wine festivals, and craft fairs.	Golden Gate National Recreation Area
<i>Crissy Field</i>			
Fort Point Overlook	Southeastern end of Golden Gate Bridge	Offers up-close scenic views of the Golden Gate Bridge. Access to bridge sidewalks (east side is available to pedestrians and west side is open to bicyclists). Adjacent to a gift center and café.	Golden Gate Bridge, Highway and Transportation District
Crissy Field	Generally bordered by Long Avenue to the west, Mason Street to the south, beach to the north, and Yacht Road to the east.	A 22-acre tidal marsh and historic air field. Contains parking spaces, 1.5-mile beach, multi-use trail, Torpedo Wharf, Battery East, the Warming Hut Café and bookstore, Beach Hut Café (adjacent to interim Crissy Field Center), and Café Crissy (at Mason and Halleck Streets).	Golden Gate National Recreation Area
Crissy Field Center	1199 East Beach (interim location)	Interim center provides a variety of environmental education and youth leadership programs.	Golden Gate National Recreation Area

TABLE VUE-1: VISITOR USE AND EXPERIENCE RESOURCES IN THE PROJECT VICINITY (CONTINUED)

Resource	Location	Activities/Facilities	Land Owner, Regulator, or Land Manager
Visitor Use And Experience Facilities in the Vicinity of Proposed Spectator Venues (cont.)			
Crissy Field (cont.)			
Gulf of the Farallones National Marine Sanctuary Headquarters	991 Marine Drive, The Presidio (West Crissy Field)	Located at the former Coast Guard Lifeboat Station consisting of five buildings that were constructed in the late 19th and early 20th century, many of which are currently undergoing rehabilitation. The Ocean Climate Center, completed under Phase 1 of the rehabilitation, serves as an ocean and climate change communication center for the Bay Area, and facilitates the exchange of technical, scientific, policy, and education information and ideas. The headquarters also features a visitor center and bookstore.	National Oceanic and Atmospheric Administration and Farallones Marine Sanctuary Association
Crissy Field CLASS 1 bike land and multi-use path	Paved path and bike lane that runs along Mason Street from the Marina Gate to West Bluff Picnic Area (west end of Crissy Field)	Multiuse path used by bicyclists, hikers, and joggers.	Golden Gate National Recreation Area
Warming Hut Café	Approach to southern end of Golden Gate bridge from Crissy Field, adjacent to interim Crissy Field Center	Offers snacks, a bookstore, and eco-friendly merchandise, as well as a picnic area with tables.	Golden Gate National Recreation Area
Torpedo Wharf	Adjacent to Crissy Field near the Warming Hut	Historic wharf used as a fishing pier.	Golden Gate National Recreation Area
Crissy Field Tidal Marsh	Generally located in the central area of Crissy Field, north of Mason Street and south of the Crissy Field Promenade/Bay Trail	Restored 22-acre tidal marsh used as a wildlife viewing area.	Golden Gate National Recreation Area
Crissy Airfield	South of Mason Street	Historical airfield currently serving as a major open space recreational area for activities ranging from picnicking to dog-walking and frisbee-throwing.	Golden Gate National Recreation Area
Crissy East Beach	East of the tidal marsh	Offers picnic areas, parking, and restroom facilities. Also a popular launching site for windsurfers, kitesurfers, and non-motorized watercraft users such as kayakers.	Golden Gate National Recreation Area
Secondary Viewing Areas			
Marin Headlands			
Kirby Cove Campground	Approximately 3,000 feet west of the Golden Gate Bridge	Campground with four sites; open April through October.	Golden Gate National Recreation Area
Bicentennial Campground	Approximately 2,000 feet west of Kirby Cove Campground	Campground with three sites; open year-round	Golden Gate National Recreation Area

TABLE VUE-1: VISITOR USE AND EXPERIENCE RESOURCES IN THE PROJECT VICINITY (CONTINUED)

Resource	Location	Activities/Facilities	Land Owner, Regulator, or Land Manager
Secondary Viewing Areas (cont.)			
Marin Headlands (cont.)			
Point Bonita Lighthouse	Point Bonita (accessible via Bunker Road and Field Road)	Lighthouse accessible via 0.5-mile trail.	Golden Gate National Recreation Area
Bird Island Overlook	Western terminus of Fort Barry Road	Scenic overlook of Bird Island and the Pacific Ocean; parking lot.	Golden Gate National Recreation Area
Rodeo Beach	Near western end of Conzelman and Field roads	Beach, picnic tables, restroom facilities, and parking facilities. Private events and functions (weddings, receptions, organized events, etc.) require special use permits. Offers views of the Pacific Ocean.	Golden Gate National Recreation Area
Battery Spencer	West of the Golden Gate Bridge and accessible via Conzelman Road	Popular viewing location of the Golden Gate Bridge and San Francisco.	Golden Gate National Recreation Area
Conzelman Road	Five-mile road from the northern foot of the Golden Gate Bridge to Point Bonita	Offers a scenic drive with scenic viewing at overlooks and a bike route; views westward to the Pacific Ocean and eastward over the Golden Gate Bridge to San Francisco.	Golden Gate National Recreation Area
Hawk Hill	Conzelman Road, Golden Gate National Recreation Area	A scenic coastal viewing site, including raptor viewing.	Golden Gate National Recreation Area
California Coastal Trail-Tennessee Valley	Section of the Coastal Trail that connects Tennessee Valley to Bunker Road	Hiking trail with expansive views of the Pacific Ocean and the Marin Headlands.	Golden Gate National Recreation Area
California Coastal Trail – Slacker Hill	Section of the Coastal Trail from the junction of Conzelman and McCullough roads to the summit of Slacker Hill	Hiking trail over Slacker Ridge along coastal area to Marin Headlands proper and Rodeo Beach; offers panoramic views of San Francisco Bay, Alcatraz Island, the San Francisco skyline, Rodeo Lagoon, and the Pacific Ocean.	Golden Gate National Recreation Area
National Park Service Visitor Center	Historic Fort Barry Chapel, at the intersection of Field and Bunker Roads	Features multiple exhibits and volunteer-led special programs, including interpretive walks.	National Park Service
Major Park Partner Programs	Throughout Marin Headlands	Programs within Marin Headlands including the Marine Mammal Center, the American Youth Hostel, the Headlands Center for the Arts, the Headlands Institute Environmental Education Center, the YMCA Youth Hostel and other smaller programs.	Golden Gate National Recreation Area
Point Bonita Lighthouse	Point Bonita	Historic lighthouse that actively serves as navigation. Docent-led tours and sightseeing available. Offers distant views of the San Francisco Bay.	Golden Gate National Recreation Area

TABLE VUE-1: VISITOR USE AND EXPERIENCE RESOURCES IN THE PROJECT VICINITY (CONTINUED)

Resource	Location	Activities/Facilities	Land Owner, Regulator, or Land Manager
Fort Point National Historic Site			
Fort Point National Historic Site	End of Marine Drive at the Presidio (east of the Warming Hut)	Features Civil War-era display, ranger-led winter night tours, a granite spiral staircase leading to a unique below-the-bridge view. Parking available at the Marin Drive lot.	Golden Gate National Recreation Area
Presidio of San Francisco (Area B) and Vicinity			
Presidio of San Francisco (Area B)	Presidio of San Francisco (overall description)	Recreational facilities in the Presidio of San Francisco (Area B) include the Presidio Golf Course, Mountain Lake Park, Rob Hill Campground, the Presidio Community YMCA, and numerous playgrounds, tennis and basketball courts, multiuse fields, picnic areas, trails, and bicycle routes. Presidio of San Francisco areas in close proximity to AC34 primary viewing areas described further below.	Presidio Trust
Crissy Field West Airplane Hangars and Buildings	South of Mason Street	Provides a variety of facilities: La Petite Baleen children’s swim school, Planet Granite rock climbing gym, Sports Basement, House of Air trampoline park, USF Presidio, San Francisco Cross Fit, and San Francisco Gymnastics.	Presidio Trust
Crissy Field Overlook	Off Lincoln Boulevard and near Crissy Field Avenue	Vista point above Crissy Field that offers views of City skyline, Palace of Fine Arts, Alcatraz, and Angel Island.	Presidio Trust
Main Post	Lincoln Boulevard and Montgomery Street	Includes a main parade ground that is widely used for special events such as the San Francisco Marathon, Escape from Alcatraz, and the KNBR Bridge to Bridge race. Other attractions in the vicinity of the Main Post include the Presidio Bowling Center and the Walt Disney Family Museum.	Presidio Trust
San Francisco National Cemetery	Northern center of the Presidio of San Francisco (Area B) (just south of Lincoln Boulevard and east of Veterans Boulevard)	Thirty-acre cemetery for the nation’s military veterans and their families. This cemetery overlooks San Francisco Bay and includes a vista point at the southern end of the cemetery accessible by the Bay Area Ridge Trail.	Presidio Trust
Baker Beach			
Baker Beach	Western coast of the Presidio of San Francisco (Area B). Generally west of Lincoln Boulevard, just north of the water treatment plant (accessible via Gibson Road)	Beach with picnic area, barbecue pits, restroom facilities, parking lots, and nature viewing area. Adjacent to Batter Chamberlin and Battery Crosby.	Golden Gate National Recreation Area
China Beach	West of El Camino Del Mar and between Baker Beach and Lands End	Beach with picnic area, barbecue pits, and parking lot.	Golden Gate National Recreation Area

TABLE VUE-1: VISITOR USE AND EXPERIENCE RESOURCES IN THE PROJECT VICINITY (CONTINUED)

Resource	Location	Activities/Facilities	Land Owner, Regulator, or Land Manager
Lands End			
Lands End	Generally bounded by El Camino Del Mar, Lincoln Park to the east, Point Lobos Avenue to the south, and the Pacific Ocean to the west	Includes the Eagles Point Overlook, Cliff House, Sutro Bath ruins, USS San Francisco Memorial, picnic areas, and several coastline hiking trails offering views of the Golden Gate Bridge, Marin Headlands, Point Reyes, and Pacific Ocean.	Golden Gate National Recreation Area
<p>NOTES:</p> <p>^a Dolphin Club website: http://www.dolphinclub.org/about.html, accessed September 26, 2011.</p> <p>^b Sea Scout Ships Corsair and Viking website: http://web.mac.com/corsair_viking_skpr/Sea_Scouting_in_SF/Home.html. Viewed on February 27, 2012</p> <p>SOURCE: ESA, 2011.</p>			

Association (described below). Ships that are on display include the *Balclutha*, *C.A. Thayer*, *Eureka*, *Alma*, *Hercules*, and *Eppleton Hall* (NPS 2011a). Restroom facilities are located between the beach and Victorian Park on the east end and adjacent to the Aquatic Park Promenade/Bay Trail on the west (NPS 2012a).

San Francisco Maritime National Park Association

The San Francisco Maritime National Park Association operates a number of education programs including daytime environmental living programs at the Hyde Street Pier and daytime and overnight programs aboard USS *Pampanito*. The Association also operates overnight programs at SAFR, and a maritime store at the southern end of the Hyde Street Pier (San Francisco Maritime National Park Association 2012).

South End Rowing Club and Dolphin Club Facilities

The San Francisco Recreation and Parks Department leases two buildings located at 500 and 502 Jefferson Street (in the southeastern portion of Aquatic Park) to the South End Rowing Club and the Dolphin Club. Primary activities hosted by the two clubs include swimming, rowing, handball, running activities, and events both at and in the vicinity of Aquatic Park. The clubs provide boathouses and launching facilities for rowers, kayakers, and canoe paddlers, including providing historic wooden craft for club members’ use in the Bay. Other facilities at this location include locker rooms, restroom and shower facilities, lounge areas, and a weight room. Both buildings are open to the public on alternate days each week, Tuesday through Saturday. The South End Rowing Club and Dolphin Club have operated continuously since 1878 and 1877, respectively, and have resided in Aquatic Park since the early 1900s. The two clubs have approximately 2,000 members in total. Club members and other recreationists swim in Aquatic Park on a daily basis, generally during the early morning and evening hours. Aquatic Park is more commonly used by swimmers during late summer and early fall, because



SOURCE: Google, ESA

AC34 / Environmental Assessment (210317)

Existing Visitor Use and Experience Resources
Figure VUE-1

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these are the warm water months. The clubs also sponsor large aquatic events in San Francisco Bay, including the Alcatraz Invitational, the New Year's Day Alcatraz Swim, the Escape from Alcatraz Triathlon, and several other rowing regattas (Dolphin Club 2011; South End Rowing Club 2011).

3.7.1.2 National Park Service, Golden Gate National Recreation Area

Within the region, the National Park Service (NPS) operates the Golden Gate National Recreation Area (GGNRA) in Marin, San Francisco, and San Mateo counties. The GGNRA includes popular attractions such as the Marin Headlands, Fort Point National Historic Site, Crissy Field, Fort Mason, and Alcatraz Island, all of which would serve either as primary or secondary viewing areas for the America's Cup. Annual visitation to the GGNRA is shown to have reached 13 to 15 million visitors since 1980 (GGNRA 2011a).

Fort Mason

Fort Mason is a former military post and port of embarkation that was in use until the 1960s. Fort Mason consists of Upper and Lower Fort Mason. The Aquatic Park Promenade segment of the Bay Trail extends through Fort Mason to Fisherman's Wharf.

Upper Fort Mason sits at a higher elevation and includes the Great Meadow and the GGNRA headquarters offices. Upper Fort Mason also hosts a youth hostel, hiking and biking trails, open space parks and gardens, picnic areas, and historic buildings. The Great Meadow is a large open space area that visitors use for sitting on the grass, walking, or flying kites, among other recreational opportunities. The Great Meadow has hosted a number of large events, such as music concerts and large sporting events, in the past, though the number of these events has been reduced and a change in the type of event activities permitted is proposed. A paved path that follows the harbor edge and rises along the headland offers scenic views to the north facing Alcatraz and to the west toward the Golden Gate Bridge. This path connects San Francisco Maritime National Historical Park and Aquatic Park to Marina Boulevard to the west.

Lower Fort Mason includes the SAFR headquarters, public research library and museum collections, and the Fort Mason Center, which is used for events, programs, and organizations that support and reflect the art and culture of San Francisco. Fort Mason Center leases space out to various nonprofit organizations, such as the San Francisco Modern Art Artists Gallery and the San Francisco Children's Art Center. Greens Restaurant is also located at Fort Mason Center (Fort Mason Center 2011). Lower Fort Mason also hosts events throughout the year such as farmers markets, wine festivals, and craft fairs.

Crissy Field

Located west of the San Francisco Marina and east of the Golden Gate Bridge, Crissy Field features 100 acres of a unique, landscaped and restored natural coastal environment within an urban national park, offering educational and recreational stewardship opportunities that include a 22-acre restored tidal marsh and dunes, the scenic Crissy Field Promenade/Bay Trail, the Crissy Field Center, seating areas, a restored historic airfield, a beach, a fishing pier (Torpedo Wharf), and a Class 1 bike lane. The Crissy Field Promenade is a segment of the Bay Trail and generally follows the northern edge of Crissy

Field. East Beach, located east of the tidal marsh area, consists of several picnic areas, parking, and restroom facilities. East Beach is also a popular launching site for windsurfers, kiteboarders, and non-motorized watercraft users such as kayakers. The Crissy Field Center hosts numerous environmental programs for children and families. West Bluff Picnic Area, located at the northwest end of Crissy Field, consists of several picnic areas, parking, restroom facilities, and food and beverage facilities. The Gulf of the Farallones National Marine Sanctuary headquarters is located on Crissy Field West. Facilities include the Ocean Climate Center, Visitor Center, and classrooms (Gulf of the Farallones 2012).

Fort Point and the Bay Trail

Fort Point National Historic Site is located at the south side of the Golden Gate Bridge and at the end of Marine Drive at the Presidio of San Francisco (Area B). The fort offers special programs including a cannon loading demonstration, video programs about the history of Fort Point, and several exhibits (GGNRA 2011b). Fort Point also occasionally hosts plays and events that are typically sponsored by the Golden Gate National Parks Conservancy (described below). A parking area and restroom adjacent to Fort Point serve both the fort and the Bay Trail.

From the Warming Hut located to the north of Fort Point, the Bay Trail continues westward along Marine Drive and currently is an unimproved segment of the Bay Trail. This area is a popular fishing location and also serves as an informal launching area for surfing and windsurfing.

Fort Baker

Fort Baker is a former Army site situated in the southeastern portion of the Marin Headlands and northeast of and below the Golden Gate Bridge. The fort includes several scenic viewing areas, such as Horseshoe Cove which includes a pier accessible by the public that is a popular fishing spot and a boat launch.

Other recreational facilities at Fort Baker include the Bay Area Discovery Museum; the Travis Sailing Center, which offers sailing lessons and boat lessons; picnic areas at Horseshoe Bay; the Presidio Yacht Club; a marina for permitted moorings; the Cavallo Point lodge and spa with restaurant and bar; and hiking trails to historic batteries and viewing points. The Presidio Yacht Club clubhouse is available for use for wedding receptions and other private events on a reservation-only basis and is open to the public on weekday evenings and on weekends. The club also offers sailboat rentals to military, United States Department of Defense, NPS, and United States Coast Guard staff upon completion of the sail training program.

Fort Baker also includes a large grassy area called the Parade Grounds. Adjoining the Parade Grounds is the lodge called Cavallo Point—the Lodge at the Golden Gate. The Bay Trail follows the shoreline of Horseshoe Bay and extends north toward Sausalito along East Road (GGNRA 2011c).

Marin Headlands

The Marin Headlands features numerous recreation opportunities including an extensive trail network, access to scenic viewing areas such as Battery Spencer, beaches such as Rodeo Beach, and many other facilities. Areas that may provide scenic views of the America's Cup race events include Conzelman Road and Kirby Cove. The park's most popular viewing areas, such as Hawk Hill, are along Conzelman Road, which provides access to overlook points such as Battery Spencer that offer expansive views of the Bay, Golden Gate Bridge, and San Francisco. The entire length of this road is a scenic viewing corridor that is well used by pedestrians, bicyclists, and vehicles. Kirby Cove is accessible to hikers only and includes a campground by the beach. The Marin Headlands contain portions of the California Coastal Trail, which provide connections between Conzelman Road and Slacker Hill, and Bunker Road and Tennessee Valley. The Point Bonita Lighthouse offers distant views of the Bay (GGNRA 2011d). In addition, NPS partners that are located and operate within the Marin Headlands include the Marine Mammal Center, NatureBridge Golden Gate, Headlands Center for the Arts, Hostelling International, and YMCA Point Bonita. The NPS operates a visitor center that provides special park programs, such as interpretive walks, and park partners provide unique environmental and cultural educational programs, as well as dorm-style overnight accommodations for visitors.

Baker Beach

Located along the western coast of the Presidio of San Francisco (Area A) and accessible via Gibson Road, Baker Beach is a popular beach offering scenic views of the Golden Gate Bridge, the Marin Headlands, and the Pacific Ocean. The beach contains a picnic area, barbecue pits, restroom facilities, and a designated nature viewing area.

China Beach

This is a small beach located south of Baker Beach and accessible via Sea Cliff Avenue. The beach includes a picnic area, restroom facilities, parking, and scenic views of the Golden Gate Bridge, Marin Headlands, and Pacific Ocean.

Lands End

Lands End is located at the northwestern end of the San Francisco peninsula. Popular attractions include the Coastal Trail, which traverses the western edge of the city; Eagles Point Overlook, which is located at the northern entrance of the Coastal Trail; a scenic overlook from the Palace of the Legion of Honor; the El Camino Del Mar Trail, the West Fort Miley batteries, which offer a grassy picnic area; and a drive-in vista point at Point Lobos and 48th avenues above the Cliff House that provides expansive views of the Pacific coast. The Coastal Trail also leads to the Sutro Bath ruins and the Cliff House to the south. A new Lookout Visitor Center opened in April 2012.

Alcatraz Island

Alcatraz Island, which became part of the GGNRA in 1972, is an increasingly popular destination for visitors of the park. The island includes a variety of trails, programs, and exhibits that interpret Alcatraz Island's history and natural resources. In general, the southern half of the island is open to the public. The Agave Trail provides scenic pedestrian access from the dock along the southern side of the island. The primary attraction on Alcatraz is the Cellhouse, which is open year-round. The northern portion of the island is accessible by docent-led tours only; the northern, western, and southwestern portions of the island are restricted between February and September during the breeding season of colonial water birds that nest on the island. Several areas of the island are closed to the public for biologic resource protection and other areas and portions of buildings are closed due to public health and safety concerns (NPS 2011b). Public access to this NPS island site is through a commercial services ferry operator (Alcatraz Cruises LLC) under contract with the NPS to operate regularly scheduled service from Pier 31 and 1/2 along the San Francisco Embarcadero.

3.7.1.3 Presidio Trust/Presidio of San Francisco (Area B)

The Presidio of San Francisco is a former United States Army post and one of the oldest continuously operating military posts in the nation. It is also a National Historic Landmark consisting of over 780 contributing historic features and is renowned for its depth of history, architecture, archeology, natural features, vistas, and recreational opportunities.

The Presidio Trust, established by Congress in 1996, manages the majority of lands within the Presidio of San Francisco (Area B), including most buildings and infrastructure. The Presidio Trust manages the inland portion (approximately 80 percent) of the Presidio of San Francisco's approximately 1,491 acres, including the portion of Crissy Field from Mason Street south. All coastal areas (approximately 20 percent), including Crissy Field north of Mason Street and coastal lands, beaches, and trails west of Lincoln Boulevard. All coastal areas (approximately 20% of the Presidio), including the restored Crissy Field north of Mason Street, and coastal lands, beaches, overlooks, and trails west and north of Lincoln Boulevard (i.e., Presidio Bluffs, Battery East, and the Golden Gate Overlook), are managed by and under the jurisdiction of the NPS.

Recreational facilities in the Presidio of San Francisco (Area B) include the Presidio Golf Course, the Presidio Bowling Center, Mountain Lake Park, Rob Hill Campground, the Presidio Community YMCA, and numerous playgrounds, tennis and basketball courts, multiuse fields, picnic areas, trails, and bicycle routes. Several recreational businesses now occupy the old West Crissy airplane hangars; these include La Petite Baleen children's swim school, Planet Granite rock climbing gym, Sports Basement, House of Air trampoline park, USF Presidio, San Francisco Cross Fit, and San Francisco Gymnastics.

The parade ground at the Main Post is used for many large events. In the past, the two largest events held at the parade ground were the San Francisco Aloha Festival, which used to occur the first weekend in August; and the Free Shakespeare in the Park event, which typically occurs every weekend in September. The San Francisco Aloha Festival attracted approximately 18,000 people in one weekend, and the Free Shakespeare in the Park event typically draws 1,500 to 1,800 people over the

course of the weekend. The Aloha Festival has been discontinued at the Presidio of San Francisco (Area B) location due to construction activities, and it is not known whether the festival will return to the Presidio. Other large special events that use Presidio of San Francisco (Area B) roadways and the Main Post include races such as the Escape from Alcatraz Triathlon (at the beginning of June), the San Francisco Marathon (at the end of July), and the KNBR Bridge to Bridge race (at the beginning of October). In addition, Fleet Week generates heavy demand for parking in all areas of the Presidio of San Francisco (Area B) (The Presidio Trust 2011a and 2011b).

3.7.1.4 Golden Gate National Parks Conservancy

The Golden Gate National Parks Conservancy is a nonprofit park partner and GGNRA's official park association with a mission to preserve the Golden Gate National Parks, enhance the park visitor experience, and build a community dedicated to conserving the parks for the future. The Conservancy offers environmental education and youth leadership programs at Crissy Field Center; builds and maintain trails through the Trails Forever initiative; improves park signage, kiosks, visitor centers, and other facilities; grows native plants to restore landscapes in native plant nurseries; protects and restores habitat for endangered species; studies birds of prey at Golden Gate Raptor Observatory; promotes park-based sustainability solutions through Institute at the Golden Gate; encourages underserved communities to experience the parks; organizes volunteers of all ages to support park projects; and operates video tours, book stores, interpretive merchandise, and cafes to serve visitors and raise funds for park work (Golden Gate National Parks Conservancy 2012).

3.7.2 Organized/Group Recreational Activities

In addition to the recreation and visitor use opportunities described above, the project area and vicinity hosts several group activities between July and September. Many of the events typically occur annually, while others have been occasional events. However, together the annual and occasional events provide an indication of the level of organized activities that typically take place within the project area and vicinity. These activities are operated by and/or take place on land managed by GGNRA, SAFR, and the Presidio Trust. In addition, the San Francisco Maritime National Park Association, South End Rowing Club, and Dolphin Club operate events at the San Francisco Maritime National Historical Park. The Golden Gate National Parks Conservancy operates events throughout GGNRA and the Presidio of San Francisco (Area B). Most events operated by GGNRA, SAFR, and the Presidio Trust occur on weekends. The Golden Gate National Parks Conservancy, San Francisco Maritime National Park Association, South End Rowing Club, and Dolphin Club events occur throughout the week. **Table VUE-2** lists GGNRA, SAFR, and Presidio Trust events, including larger events sponsored by the South End Rowing Club and Dolphin Club. (The South End Rowing Club and Dolphin Club also coordinate organized swimming and rowing activities throughout the year). **Table VUE-3** lists events permitted or managed by the San Francisco Maritime National Historical Park and GGNRA that are held at or in the vicinity of AC34 primary and secondary viewing areas.

In addition to hosted events, individual activities such as boardsailing (kite and windsurfing), take place in the project area and vicinity in a rectangular open water area generally bounded by St. Francis Yacht Club (on the eastern edge of Crissy Field) to the east, in and around the Golden Gate Bridge (the

TABLE VUE-2: GGNRA, SAN FRANCISCO MARITIME NATIONAL HISTORICAL PARK, AND PRESIDIO OF SAN FRANCISCO (AREA B) JULY THROUGH SEPTEMBER CALENDAR OF EVENTS

Location/Event	Event Month
San Francisco Maritime National Historical Park / Aquatic Park	
4th of July	July
East Beach to Fort Point to San Francisco Maritime National Historical Park – Asha Run	July
San Francisco Maritime National Historical Park – South End Rowing Club Alcatraz Swim (operated by South End Rowing Club)	September
San Francisco Maritime National Historical Park – Presidents Conference	July
Water World Swim	September
Baker Beach	
Oyster Urban Race	September
Crissy Field	
Crissy Field Airfield – Teach with African Run	July
East Beach – Alcatraz Challenge Swim & Run	July
East Beach – Windsurfing Nationals	July
West Bluff Amphitheater – Animationmentor.com (held at Fort Mason Great Meadow in 2011)	July or August
East Beach – Outrigger Canoe Races	August
Crissy Field Airfield – Age March	August
East Beach – Juneteenth Triathlon	August
Crissy Field Airfield – Nike Training Run	August
Crissy Field Airfield – American Cancer Society event	August
East Beach – 5K Run	August
Golden Gate Crissy Field Promenade/Bay Trail – Marina Green 5K	September
West Bluff Amphitheater – Apple Picnic	September
West Bluff Amphitheater – Universal McCann Picnic	September
West Bluff Amphitheater – Bridge Suicide Awareness event	September
East Beach – Swim Across America	September
East Beach – Dolphin South End Distance Classic (scheduled to occur at Fort Mason in 2012, as well as at Crissy Field)	July
East Beach – Junior Windsurfing World Championships	July
Crissy Field Airfield – Outdoor Nation-Summer Fun Day	July
Crissy Field Airfield – Relay for Life	July or August
East Beach – Northern California Outrigger Canoe Association Race	August
East Beach – Laser Masters Worlds	August
East Beach – 18 Skiff	August
Golden Gate Crissy Field Promenade/Bay Trail – Ragnat Relay	September
Japanese Community Youth Council Run	September
Crissy Airfield Section A – Guardsmen Bike Event	September
Crissy Airfield Section A – House of Air Anniversary	September
Crissy Airfield Section B – Liver Foundation Walk	September

TABLE VUE-2: GGNRA, SAN FRANCISCO MARITIME NATIONAL HISTORICAL PARK, AND PRESIDIO OF SAN FRANCISCO (AREA B) JULY THROUGH SEPTEMBER CALENDAR OF EVENTS (CONTINUED)

Location/Event	Event Month
Fort Baker	
Bay Area Discovery Museum Summer Camp Forts	July
Coast Guard Day	August
Bay Area Discovery Museum Free Admission Day	August
Wavechasers	August
US Surfski Championship	
Fort Mason	
Fort Mason Great Meadow – Cameron House Event	July
Fort Mason Great Meadow – Avon Walk for Breast Cancer (also crosses Presidio of San Francisco)	July/August (typically 2 days per summer)
Fort Mason Great Meadow – West Coast Country Music Festival	July
Fort Mason Parade Ground – Annual Swiss Dog Days	August
Fort Mason Great Meadow – Bridge to Hope 2010	September
Fort Mason Great Meadow – Hamlin School Picnic	September
Fort Mason Great Meadow – Animationmentor.com (held at West Bluff Amphitheater in 2010)	July or August
Fort Mason – Dolphin South End Distance Classic (scheduled to occur at Crissy Field in 2012, as well as at Fort Mason)	July
Presidio of San Francisco	
GGNRA Presidio – Great Urban Race	August
GGNRA Presidio – TriCal Triathlon	August
Main Post Parade Ground – San Francisco Shakespeare in the Park set up	August
Multiple Locations	
San Francisco Marathon	July
All Lands End run-through – Golden Gate Bridge Vista 10K	August
Terry Davis Alcatraz Tri	August
San Francisco Maritime to Fort Mason – Ferry Building 4 Mile	July
GGNRA Presidio to San Francisco Maritime National Historical Park – Horning Triathlon	July
Fort Baker to Fort Point – United States Coast Guard Heritage Run	August
Crissy Field and Fort Mason to San Francisco Maritime – Walt Stack 10K	August
Fort Mason to Fort Point – Big Gay 10K	August
Giants Half Marathon	August
Komen Walk for the Cure	September (can be a 2-day event)
Eagle Gibbs and Sollecito Ceremony	July
Bark for Life	July
Sharkfest	July
SOURCE: NPS, July through September Event Calendar, 2010.	

TABLE VUE-3: SAN FRANCISCO MARITIME NATIONAL PARK ASSOCIATION AND GOLDEN GATE NATIONAL PARKS CONSERVANCY JULY THROUGH SEPTEMBER CALENDAR OF EVENTS

Location/Event	Event Month
San Francisco Maritime National Historical Park	
4th of July BBQ HSP	July
Old Time Auto Day	July
Float Films – Eureka	July, August, and September
Kayak Launch - Triathlon California Event	July
Speaker series - museum lobby	July
Leukemia Swim	July, August, and September
OrganR'us - San Francisco Marathon	July
Water World Swim - Pedro Ordenes	August
Lecture of the Princess Tai Ping	August
See Jane Run - Swim and Run	August
Cosmo Space of America	September
GNRA Fun Run and Walk Reception on Eureka	September
Hydeway event by the Association at the museum	September
Moby Dick movie event by the Association aboard Eureka	September
BBQ at Bocce Ball Court	September
Crissy Field	
Crissy Field Aviation Walk	Once in July
Flower Fables on Crissy Field	Once in September
Birds Around the Marsh	Once in August
Presidio of San Francisco	
Fort Point – Pier Crabbing	Every Saturday, July – August
Shuttle Through Time	Every Friday and Sunday in July
National Commentary Walk	The first Thursday and fourth Sunday, July – September
From Post to Park Walk	Once a month, July – September
The Last Gun	First Saturday and Sunday of each month
Presidio Birdlife	Once in September
Three Flags of the Presidio	Bi-monthly in July and August
Pedaling the Presidio	Once in September
Additional one-time special events	July and August
Marin Headlands	
Beginning Bird Watching	Sundays once a month
Nike Missile Site Open House	First Saturday of each month
Family Night Hike and Camp	Saturdays once a month, July – September
Lighthouses of San Francisco Bay	First Sunday of each month
Battery Townsley Open House	First Sunday of each month
Coastal Defenses of San Francisco Bay	First Sunday of each month
Sunset/Full Moon walk to the Point Bonita Lighthouse	Once in August
Hawkwatch with Golden Gate Raptor Observatory	Twice in September
Hawk talk and banding demo	Every Saturday and Sunday, September
Seven Miles in Marin	Once in July
Family Explore and Bay Sail	Once in September
Coastal Cleanup Day	Once in September
Preschool Programs	Once in September
Fort Baker	
Junior Ranger Hike	Third Sunday in July and August
Fort Baker Revealed	Quarterly
Historic Fort Baker Tour	Once in September

area around North Tower being particularly popular) to the west, and Fort Baker to the north. Crissy Field is used as the primary launching site, though some boardsailors use the small beach near St. Francis Yacht Club. Some kite surfers and formula boardsailors (who use boards capable of handling less wind) use areas east of the yacht club. Standup paddlers are typically out in the morning when wind is lower. A minimum of 100 boardsailors are usually in the project area and vicinity on mid-week days, approximately between 2:30 p.m. and 8:00 p.m. Approximately 200 to 300 boardsailors (and a peak of up to 400 under optimal conditions) use the area between approximately 12:00 p.m. and 8:00 p.m. on weekends (San Francisco Boardsailing Association 2012).

3.7.3 Use Types and Use Intensity

Visitor use statistics were collected at GGNRA and SAFR lands in the project vicinity during an 11-day study period in August and September 2011, and on October 8, 2011, the Saturday of Fleet Week (ORCA 2012), with adjustments based on observations made by GGNRA and SAFR staff. The data collected included three representative sample time of day counts: 9:00 a.m. to 11:00 a.m., 1:00 p.m. to 3:00 p.m., and 4:30 p.m. to 6:30 p.m., with half-hour counts for bikes/pedestrians and hourly counts for people in the area at one time (PAOT). These counts were then used in aggregating a total daytime count for the different periods throughout the day at NPS areas at key points along the waterfront. In general, the August visitor use counts were slightly higher than September counts, except for the Crissy Field area. Usage levels on the Fleet Week day were much higher than average weekend use, as shown below (as summarized from ORCA 2011a). The existing visitor use data were used to determine estimated levels of service (LOS) for pedestrian/bicycle flow volumes and people at one time levels (ORCA 2012). Level of service is a qualitative description of a range of conditions, as follows:

- LOS “A” corresponds to spacious and comfortable conditions (all visitors have excellent views and/or comfort);
- LOS “B” corresponds to busy, yet comfortable conditions (almost all visitors have good views and/or comfort);
- LOS “C” corresponds to crowded but manageable conditions (a significant portion of the visitors have reduced views and/or comfort);
- LOS “D” corresponds to very crowded conditions (the majority of the visitors have reduced views and/or comfort, and experience uncomfortable crowding levels);
- LOS “E” corresponds to extremely crowded with intermittent gridlock conditions; and
- LOS “F” corresponds to severe crowding with ongoing and potentially unsafe gridlock conditions.

The LOS determinations were based on visitor density ranges for each specific public space type, as shown in **Table VUE-4**. The following sections describe the visitor use levels from the August, September, and Fleet Week counts, and the level of service based on the public space type and the size of each public space type.

TABLE VUE-4: VISITOR DENSITY STANDARDS FOR PROJECT AREA

	LOS A (no crowding)	LOS B (minor crowding)	LOS C (manageable crowding)	LOS D (very crowded)	LOS E (extreme crowding)	LOS F (severe crowding)
Beach ^a	400+	200-400	150-200	90-150	50-90	<50
Defined Viewscape ^a	200+	100-200	54-100	33-54	26-33	<26
Walkway ^a	400+	200-400	150-200	80-150	50-80	<50
Open Recreational Spaces ^a	1,000+	500-1,000	300-500	200-300	100-200	<100
Blend – Recreational Space and Defined Viewscape ^a	600+	300-600	200-300	120-200	60-120	<60
Blend – Defined Viewscape and Walkway (including promenades) ^a	300+	150-300	102-150	56-102	38-56	<38
Aquatic Park Tiered Waterfront Seating Area ^a	140+	70-140	40-70	22-40	18-22	<18
Aquatic Park Bleachers ^a	20+	15-20	13-15	13	13	<13
Unique – Linear Viewing ^b	10+	5-10	3-5	2-3	1.5-2	<1.5
NOTES: LOS = level of service ^a Density standards are shown in square feet per person. ^b Density standards are shown in linear feet per person. SOURCE: ORCA, 2012.						

3.7.3.1 San Francisco Maritime National Historical Park

Pedestrian and bicycle flow counts were taken on Jefferson Street, near the east end of Aquatic Park at the traffic bollards, and on the Aquatic Park Promenade/Bay Trail north of the Maritime Museum. People-at-one-time (PAOT) counts were taken at most of the major public areas in Aquatic Park. Visitor flow counts were also taken on the Aquatic Park Promenade/Bay Trail at the west end of Aquatic Park. As Table VUE-5 shows, the pedestrian flow counts were much higher on the Fleet Week Day, but bicycle counts were lower, indicating that a portion of the bicyclists used an alternate route. The PAOT count for the selected areas was 14.9 times higher; this increase is due both to the higher flow volumes and longer length of stay in Aquatic Park for Fleet Week. The LOS analysis for flow along walkways and paths and people at one time indicates that there is no to minor crowding on most existing weekdays and weekends, but manageable to severe crowding was observed during Fleet Week.

3.7.3.2 Fort Mason/Laguna Street Pedestrian Access and Fort Mason Great Meadow

Pedestrian and bicycle flow counts were taken at the west corner of the Fort Mason green and at the Laguna Street pedestrian/bicycle path entrance to Fort Mason. PAOT counts were taken at the Great Meadow. As Table VUE-6 indicates, bicycle use was substantially higher at Laguna Street on the Fleet

TABLE VUE-5: SAN FRANCISCO MARITIME NATIONAL HISTORICAL PARK VISITOR USE

	Existing Weekday ^a	Existing Weekend	Fleet Week Saturday (10/8/2011)	Fleet Week Factor ^b
Jefferson Street (northeast entry to Aquatic Park)				
Pedestrians	4,802	9,157	17,925	2.0
Bicycles	2,058	3,053	2,215	0.7
Pedestrians and Bicycles	6,860	12,210	20,140	1.6
Peak Hour Traffic	840	1,580	2,910	1.8
Walkway Level of Service for Peak Hour Volumes	B	B	D	
Aquatic Park Promenade/Bay Trail at Maritime Museum				
Pedestrians	3,621	5,460	19,519	3.6
Bicycles	2,219	2,690	2,413	0.9
Pedestrians and Bicycles	5,840	8,150	21,932	2.7
Peak Hour Traffic	850	920	3,910	4.3
Walkway Level of Service for Peak Hour Volumes	B	B	E	
Aquatic Park Promenade/Bay Trail at West End of Aquatic Park				
Pedestrians	2,688	2,996	10,250	3.4
Bicycles	672	1,284	1,267	1.0
Pedestrians and Bicycles	3,360	4,280	11,517	2.7
Peak Hour Traffic	560	620	1,664	2.7
Walkway Level of Service for Peak Hour Volumes	B	C	C	
Selected Areas – People at One Time				
Peak Period of the Day	300	570	8,475	14.9
Level of Service for Peak Period of the Day	A	B	F	
NOTES:				
^a Indicated volumes represent estimated daily two-way flow volumes for the indicated locations. The “Max People at One Time” figure represents the highest observed visitor counts for all locations counted within the study area.				
^b Since the Fleet Week day was a Saturday, this factor is computed simply by dividing the volume for 10/8/2011 by the weekend day volume.				
SOURCE: ORCA, 2012.				

Week day, suggesting that bicyclists likely took an alternate route around Aquatic Park on this day. Pedestrian flow counts were twice as high on the Fleet Week day. Many visitors enjoyed Fleet Week from the Great Meadow; many of these may have been overflow crowds from Aquatic Park, due to the high crowding there. The LOS analysis for flow along walkways and paths and people at one time indicates that there is minor to manageable crowding on most existing weekdays and weekends (especially at the point near Laguna Street where bikes and pedestrians converge) but manageable to severe crowding was observed during Fleet Week.

TABLE VUE-6: FORT MASON/LAGUNA STREET AND FORT MASON GREAT MEADOW VISITOR USE

	Existing Weekday ^a	Existing Weekend	Fleet Week Saturday (10/8/2011)	Fleet Week Factor ^b
Bay Trail at East End of Fort Mason				
Pedestrians	2,628	3,942	9,854	2.5
Bicycles	1,752	2,628	1,604	0.6
Pedestrians and Bicycles	4,380	6,570	11,458	1.7
Peak Hour Traffic	580	760	1,656	2.2
Walkway Level of Service for Peak Hour Volumes	B	B	C	
Fort Mason/Laguna Street Entrance Point				
Pedestrians	1,875	4,452	9,058	2.0
Bicycles	2,485	2,968	3,882	1.3
Pedestrians and Bicycles	4,360	7,420	12,940	1.7
Peak Hour Traffic	520	1,040	1,950	1.9
Walkway Level of Service for Peak Hour Volumes	C	D	F	
Great Meadow – People at One Time				
Peak Period of the Day	100	270	1,444	5.3
Level of Service for Peak Period of the Day	B	C	E	
NOTES:				
^a Indicated volumes represent estimated daily two-way flow volumes for the indicated locations. The “Max People at One Time” figure represents the highest observed visitor counts for all locations counted within the study area.				
^b Since the Fleet Week day was a Saturday, this factor is computed simply by dividing the volume for 10/8/2011 by the weekend day volume.				
SOURCE: ORCA, 2012.				

3.7.3.3 Crissy Field East

Crissy Field East is defined as the area of Crissy Field east of the airfield; this includes the beach (to the north and northeast of the tidal marsh), Crissy Field Promenade/Bay Trail, and recreational areas south of the Crissy Field Promenade/Bay Trail. As shown in **Table VUE-7**, visitor flow was slightly higher on the Fleet Week day on the south side of Crissy Field east at the multiuse path adjacent to Mason Street. The pedestrian flow on the Crissy Field Promenade/Bay Trail near the east side of the tidal marsh and north side of Crissy Field appears to have been lower on Fleet Week day; this indicated that visitation to west Crissy Field areas by those arriving at the east end of Crissy Field was less than is experienced on the typical weekend day. The maximum PAOT counts were much higher on Fleet Week day. The increase in the number of people in one time suggests that people were staying much longer, and that use of Crissy Field by walkers, hikers, and joggers was displaced by Fleet Week spectators. The LOS analysis for flow along walkways and paths and people at one time indicates that there is no to minor crowding on most existing weekdays and weekends, as well as for Fleet Week pedestrian and bicycle use areas. However, extreme crowding for people at one time was observed during Fleet Week.

TABLE VUE-7: CRISSY FIELD EAST VISITOR USE

	Existing Weekday ^a	Existing Weekend	Fleet Week Saturday (10/8/2011)	Fleet Week Factor ^b
Multiuse Path on Mason Street Side of Crissy Field East				
Pedestrians	1,212	2,563	5,481	2.1
Bicycles	1,818	2,777	4,669	1.7
Pedestrians and Bicycles	3,030	5,340	10,150	1.9
Peak Hour Traffic	330	710	1,420	2.0
Walkway Level of Service for Peak Hour Volumes	A	B	C	
Waterfront Entry for Crissy Field East				
Pedestrians	1,534	3,969	2,524	0.6
Bicycles	626	871	1,031	1.2
Pedestrians and Bicycles	2,160	4,840	3,555	0.7
Peak Hour Traffic	270	600	440	0.7
Walkway Level of Service for Peak Hour Volumes	A	B	B	
East of Tidal Marsh at Crissy Field East				
Pedestrians	2,625	5,265	4,193	0.8
Bicycles	875	1,235	1,324	1.1
Pedestrians and Bicycles	3,500	6,500	5,517	0.8
Peak Hour Traffic	440	820	720	0.9
Walkway Level of Service for Peak Hour Volumes	A	B	B	
Crissy Field East – People at One Time				
Peak Period of the Day	150	360	3,840	10.7
Level of Service for Peak Period of the Day	A	A	D	
NOTES:				
^a Indicated volumes represent estimated daily two-way flow volumes for the indicated locations. The “Max People at One Time” figure represents the highest observed visitor counts for all locations counted within the study area.				
^b Since the Fleet Week day was a Saturday, this factor is computed simply by dividing the volume for 10/8/2011 by the weekend day volume.				
SOURCE: ORCA, 2012.				

3.7.3.4 Crissy Field West

Crissy Field West is defined as the portion of Crissy Field west of the tidal marsh, including the airfield, multi-use path, portion of Crissy Field Promenade/Bay Trail, and shoreline – this is bordered to the east by the tidal marsh, and to the west by the Bluffs. As shown in **Table VUE-8**, except at the Long Avenue/Lincoln Boulevard intersection, bicycle traffic on the Fleet Week day was the same as or less than on the comparison weekend day. Pedestrian traffic for the Mason/Crissy Field and Long Avenue/Lincoln Boulevard intersections was considerably higher for Fleet Week day, suggesting that many more visitors may have been traveling to Crissy Field West from the Golden Gate Bridge areas. The Crissy Field Promenade/Bay Trail pedestrian count at the west end of the tidal marsh actually increased on Fleet Week Day, whereas the similar count on the east side of the marsh decreased; this

TABLE VUE-8: CRISSY FIELD WEST VISITOR USE

	Existing Weekday ^a	Existing Weekend	Fleet Week Saturday (10/8/2011)	Fleet Week Factor ^b
Crissy Field Promenade/Bay Trail at East End of Airfield				
Pedestrians	2,000	3,449	2,299	0.7
Bicycles	740	1,341	438	0.3
Pedestrians and Bicycles	2,740	4,790	2,737	0.6
Peak Hour Traffic	310	630	950	
Walkway Level of Service for Peak Hour Volumes	A	B	B	
Crissy Field Promenade/Bay Trail at West End of Airfield				
Pedestrians	1,735	3,726	4,674	1.3
Bicycles	675	874	890	1.0
Pedestrians and Bicycles	2,410	4,600	5,564	1.2
Peak Hour Traffic	270	580	840	1.4
Walkway Level of Service for Peak Hour Volumes	A	B	B	
Intersection of Mason Street and Crissy Field Avenue				
Pedestrians	1,536	3,644	9,863	2.7
Bicycles	3,264	5,466	5,311	1.0
Pedestrians and Bicycles	4,800	9,110	15,174	1.7
Peak Hour Traffic	590	1,280	2,250	1.8
Walkway Level of Service for Peak Hour Volumes	C	C	D	
Crissy Field West – People at One Time				
Peak Period of the Day	100	330	1,066	3.2
Level of Service for Peak Period of the Day	A	A	A	
NOTES:				
^a Indicated volumes represent estimated daily two-way flow volumes for the indicated locations. The "Max People at One Time" figure represents the highest observed visitor counts for all locations counted within the study area.				
^b Since the Fleet Week day was a Saturday, this factor is computed simply by dividing the volume for 10/8/2011 by the weekend day volume.				
SOURCE: ORCA, 2012.				

could perhaps indicate that the middle portion of Crissy Field is more accessible from the west side during Fleet Week or other very congested periods at Marina Green where Halleck Street is closed. It also may indicate that parking availability was greater in western portions of the Presidio (i.e., Fort Scott) with pedestrian-only access via Long or McDowell.

As in the previous study areas, the maximum PAOT counts experienced a higher increase than the pedestrian and bicycle flow counts on the Fleet Week day, reflecting that lengths of stay were higher on this day. However, the increase was much less significant than those shown for the previous areas, indicating that Crissy Field West was a much less popular area for Fleet Week viewing than the other areas studied. The LOS analysis for flow along walkways and paths and people at one time indicates that there is no to minor crowding on most existing weekdays and weekends, including Fleet Week.

3.7.3.5 Crissy West Picnic Area

The Crissy West Picnic Area includes the Bluffs and Warning Hut areas. As shown in Table VUE-9, for the Fleet Week day, bicycle counts were less than for the comparable weekend day, and pedestrian counts were higher by about 50%. The maximum PAOT count was 2.2 times as high for the Fleet Week day, again showing the effect of higher flow volumes and longer lengths of stay on this day. The LOS analysis for flow along walkways and paths and people at one time indicates that there is no to minor crowding on most existing weekdays and weekends, with manageable crowding during Fleet Week.

TABLE VUE-9: CRISSY WEST PICNIC AREA VISITOR USE

	Existing Weekday ^a	Existing Weekend	Fleet Week Saturday (10/8/2011)	Fleet Week Factor ^b
Crissy Field Promenade/Bay Trail – East of Picnic Area				
Pedestrians	1,986	3,800	5,262	1.4
Bicycles	734	1,010	928	0.9
Pedestrians and Bicycles	2,720	4,810	6,190	1.3
Peak Hour Traffic	390	610	800	1.3
Walkway Level of Service for Peak Hour Volumes	A	B	B	
Crissy Field Promenade/Bay Trail near Warming Hut				
Pedestrians	1,711	4,607	7,253	1.6
Bicycles	769	813	806	1.0
Pedestrians and Bicycles	2,480	5,420	8,059	1.5
Peak Hour Traffic	340	660	1,010	1.5
Walkway Level of Service for Peak Hour Volumes	A	B	B	
Crissy West Picnic Area – People at One Time				
Peak Period of the Day	180	530	1,159	2.2
Level of Service for Peak Period of the Day	A	B	C	
NOTES:				
^a Indicated volumes represent estimated daily two-way flow volumes for the indicated locations. The “Max People at One Time” figure represents the highest observed visitor counts for all locations counted within the study area.				
^b Since the Fleet Week day was a Saturday, this factor is computed simply by dividing the volume for 10/8/2011 by the weekend day volume.				
SOURCE: ORCA, 2012.				

3.7.3.6 Fort Point

Pedestrian and bicycle and PAOT counts were conducted at Fort Point and indicate that there were slight increases at Fort Point on the Fleet Week day, as shown in Table VUE-10. The LOS analysis for flow along walkways and paths and people at one time indicates that there is no to manageable crowding on most existing weekdays and weekends. However, very crowded conditions were observed during Fleet Week at the waterfront viewing locations.

TABLE VUE-10: FORT POINT VISITOR USE

	Existing Weekday ^a	Existing Weekend	Fleet Week Saturday (10/8/2011)	Fleet Week Factor ^b
Long Avenue/Lincoln Boulevard Intersection				
Pedestrians	332	697	2,522	3.6
Bicycles	2,038	2,473	2,732	1.1
Pedestrians and Bicycles	2,370	3,170	5,254	1.7
Peak Hour Traffic	340	470	810	1.7
Walkway Level of Service for Peak Hour Volumes	B	B	C	
Marine Drive to Fort Point				
Pedestrians	1,153	2,736	3,025	1.1
Bicycles	707	1,064	1,235	1.2
Pedestrians and Bicycles	1,860	3,800	4,260	1.1
Peak Hour Traffic	250	530	740	1.4
Walkway Level of Service for Peak Hour Volumes	B	C	D	
Fort Point – People at One Time				
Peak Period of the Day	50	120	161	1.3
Level of Service for Peak Period of the Day	A	C	C	
NOTES:				
^a Indicated volumes represent estimated daily two-way flow volumes for the indicated locations. The “Max People at One Time” figure represents the highest observed visitor counts for all locations counted within the study area.				
^b Since the Fleet Week day was a Saturday, this factor is computed simply by dividing the volume for 10/8/2011 by the weekend day volume.				
SOURCE: ORCA, 2012.				

3.7.3.7 Golden Gate Bridge Plaza and Bridge Access Routes

Pedestrian and bicycle and PAOT counts were conducted at the Golden Gate Bridge plaza area and indicate that flow counts were somewhat higher for pedestrians on the Fleet Week day and somewhat higher for bicycles, as shown in **Table VUE-11**. The PAOT counts were collected in two sub-zones of the plaza, so the indicated counts reflect only a portion of the total number of people who were at the plaza on the study days. The LOS analysis for flow along walkways and paths and people at one time indicates that there is minor to manageable crowding on most existing weekdays and weekends, and manageable to very crowded conditions during Fleet Week.

3.7.3.8 Battery Spencer

Pedestrian flow counts were taken on the walking path to Battery Spencer along with PAOT counts on weekends and the Fleet Week Day. Due to road construction projects, Battery Spencer was closed on weekdays when counts were taken. Therefore, no information is available for weekday use patterns. The visitor use counts indicate that visitor flow counts were up to 50% higher on the Fleet Week day compared to the comparison weekend day, and the PAOT counts were higher by a factor of 3.4, as shown in **Table VUE-12**. The LOS analysis for flow along walkways and paths and people at one time indicates that there is minor to manageable crowding on most existing weekdays and weekends, and minor crowding to very crowded conditions during Fleet Week.

TABLE VUE-11: GOLDEN GATE BRIDGE PLAZA AND BRIDGE ACCESS ROUTES VISITOR USE

	Existing Weekday ^a	Existing Weekend	Fleet Week Saturday (10/8/2011)	Fleet Week Factor ^b
Coastal Trail at West Side of Golden Gate Bridge Plaza				
Pedestrians	1,336	2,351	3,830	1.6
Bicycles	784	2,259	2,890	1.3
Pedestrians and Bicycles	2,120	4,610	6,719	1.5
Peak Hour Traffic	290	630	910	1.4
Walkway Level of Service for Peak Hour Volumes	B	B	C	
Coastal Trail at East Side of Golden Gate Bridge Plaza				
Pedestrians	1,487	2,948	4,534	1.5
Bicycles	733	2,832	2,898	1.0
Pedestrians and Bicycles	2,220	5,780	7,432	1.3
Peak Hour Traffic	370	940	1,030	1.1
Walkway Level of Service for Peak Hour Volumes	B	C	C	
Golden Gate Bridge Plaza – People at One Time				
Peak Period of the Day	20	50	93	1.9
Level of Service for Peak Period of the Day	B	C	D	
NOTES:				
^a Indicated volumes represent estimated daily two-way flow volumes for the indicated locations. The “Max People at One Time” figure represents the highest observed visitor counts for all locations counted within the study area.				
^b Since the Fleet Week day was a Saturday, this factor is computed simply by dividing the volume for 10/8/2011 by the weekend day volume.				
SOURCE: ORCA, 2012.				

TABLE VUE-12: BATTERY SPENCER VISITOR USE

	Existing Weekday ^a	Existing Weekend Day	Fleet Week Saturday (10/8/2011)	Fleet Week Factor ^b
Battery Spencer Main Walkways				
Pedestrians	--	940	1,270	1.4
Peak Hour Traffic	85	170	260	1.5
Walkway Level of Service for Peak Hour Volumes	A	A	B	
Battery Spencer – People at One Time				
Peak Period of the Day	20	40	137	3.4
Level of Service for Peak Period of the Day	A	B	D	
NOTES:				
^a Indicated volumes represent estimated daily two-way flow volumes for the indicated locations. The “Max People at One Time” figure represents the highest observed visitor counts for all locations counted within the study area.				
^b Since the Fleet Week day was a Saturday, this factor is computed simply by dividing the volume for 10/8/2011 by the weekend day volume.				
-- = Not calculated				
SOURCE: ORCA 2012				

3.7.3.9 Fort Baker

Flow and PAOT counts were taken at Fort Baker only on the Fleet Week Day (October 8, 2011), and estimates for general weekdays and weekends were derived from those data counts. The flow counts for three roads along the main routes within Fort Baker are shown in Table VUE-13. Also, the maximum people at one time at the shoreline area was documented at 1,133 people. The LOS analysis for flow along walkways and paths and people at one time indicates that there is no to minor crowding on most existing weekdays and weekends, and minor to acceptable crowding during Fleet Week due to managed conditions and staffing.

TABLE VUE-13: FORT BAKER VISITOR USE

	Existing Weekday ^a	Existing Weekend	Fleet Week Saturday (10/8/2011)	Fleet Week Factor ^b
Center Road				
Pedestrians	48	96	193	2.0
Bicycles	352	704	1,417	2.0
Pedestrians and Bicycles	400	800	1,610	2.0
Peak Hour Traffic	130	250	500	2.0
Walkway Level of Service for Peak Hour Volumes	B	B	C	
Moore Road				
Pedestrians	--	--	1,197	--
Bicycles	--	--	1,723	--
Pedestrians and Bicycles	730	1,460	2,920	2.0
Peak Hour Traffic	150	290	590	2.0
Walkway Level of Service for Peak Hour Volumes	B	B	C	
Sommerville Road				
Pedestrians	--	--	2,313	--
Bicycles	--	--	257	--
Pedestrians and Bicycles	640	1,280	2,570	2.0
Peak Hour Traffic	150	310	620	2.0
Walkway Level of Service for Peak Hour Volumes	A	B	B	
Fort Baker – People at One Time				
Peak Period of the Day	280	570	1,133	2.0
Level of Service for Peak Period of the Day	A	C	C	
NOTES:				
^a Indicated volumes represent estimated daily two-way flow volumes for the indicated locations. The "Max People at One Time" figure represents the highest observed visitor counts for all locations counted within the study area.				
^b Since the Fleet Week day was a Saturday, this factor is computed simply by dividing the volume for 10/8/2011 by the weekend day volume.				
-- = Not calculated				
SOURCE: ORCA, 2012.				

3.7.4 References

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