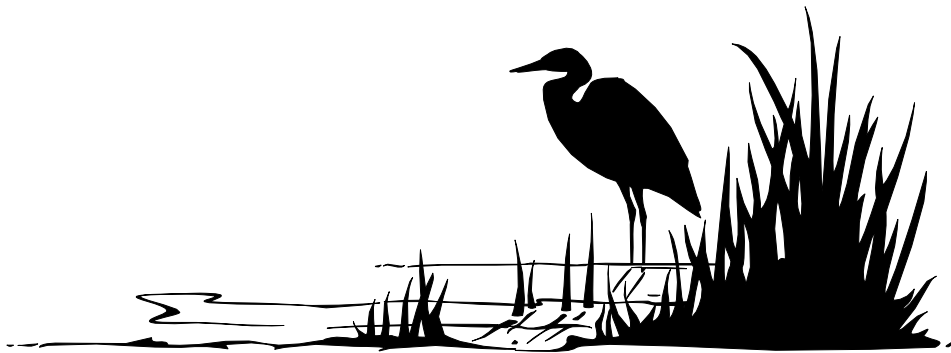


**SPECIAL-STATUS PLANT SURVEY AND  
HABITAT ASSESSMENT OF YERBA BUENA ISLAND,  
SAN FRANCISCO COUNTY, CALIFORNIA**



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## SUMMARY

Yerba Buena Island is a natural geologic feature situated in San Francisco Bay between the cities of San Francisco and Oakland. The island itself is located within San Francisco County limits. Yerba Buena Island has been under continuous control of the United States military since 1867 and has been off-limits to the general public. The island has been used as an artillery base, Army quartermast depot, torpedo station, naval training station and naval receiving ship. Currently, Yerba Buena Island supports officer's family housing, a U.S. Coast Guard base and navigation center.

The U.S. Navy currently controls approximately three-quarters of the area of Yerba Buena Island; the remainder of the island is controlled by the U.S. Coast Guard. The Defense Base Realignment and Closure Act (BRAC) of 1990 has directed that military installations be closed and realigned. In 1993, the BRAC Commission established a closure date for Naval Station Treasure Island (NAVSTATI) and those portions of Yerba Buena Island under Navy control of September 30, 1997. Treasure Island and the Navy-controlled portion of Yerba Buena Island will then be turned over to the City and County of San Francisco. The U.S. Coast Guard will continue to operate at Yerba Buena Island after the Naval Station closes.

Yerba Buena Island has a long history of human disturbance since early colonization. Use of the island for goat grazing, removal of the native oak trees for fuel and building, and the spread of invasive exotic plants have resulted in the loss of much of the natural vegetation. However, several excellent examples of some of the San Francisco Peninsula's original vegetation still remain. Of special interest are stands of Northern (Franciscan) Coastal Scrub and Coast Live Oak Woodland. These vegetation types are similar to remaining stands still found in the City of San Francisco and are probably more closely related to the prehistoric flora of San Francisco than any other land mass bordering the Bay, with the possible exception of Angel Island. Some portions of these native plant communities are remarkably intact and may represent a very valuable genetic resource. Several plant taxa found on Yerba Buena Island occur in only very limited numbers in San Francisco, making them a potential source of genetically appropriate propagules for restoration efforts on the mainland.

No state- or federally-listed endangered, threatened or rare plant taxa were found during these surveys. However, numerous plant taxa of botanical significance were found. Perhaps of greatest interest is the presence of numerous populations of dune gilia (*Gilia capitata* ssp. *chamissonis*). Within San Francisco, dune gilia occurs at several locations in the Presidio and one location in the Sunset District on Hawk Hill. It is restricted to sand hills and dunes between San Francisco and Bodega Bay. Dune gilia is currently being considered for placement on the California Native Plant Society's List 1B.

Other taxa of botanical interest detected include Dutchman's pipe (*Aristolochia californica*), large-flowered sand-spurrey (*Spergularia macrotheca* var. *macrotheca*), yellow bush lupine (*Lupinus arboreus*), stinging phacelia (*Phacelia malvifolia*), fiesta flower (*Pholistoma auritum* var. *auritum*), common montia (*Claytonia exigua* ssp. *exigua*). In addition, Yerba Buena Island supports numerous mature individuals of what are presumed to be indigenous coast live oaks (*Quercus agrifolia*) and oso berry (*Oemleria cerasiformis*), some very large toyons (*Heteromeles arbutifolia*) and California buckeye (*Aesculus californica*). The presence of species and others

may represent valuable biological resources not only because they represent relicts of the original flora of the island but because they could provide an important genetic resource for future habitat restoration efforts on the island and the San Francisco Peninsula as well.

This work represents perhaps the first detailed assessment of the flora of Yerba Buena Island. Because the island has been under control of the military, it has not been readily accessible to botanists for over 100 years. Yerba Buena Island could not be surveyed during preparation of the flora of San Francisco by Howell, Raven and Rubtzof in 1958, and as a result, was not included in the flora. No recent or historical survey of the plants of Yerba Buena Island has ever been published.

It is hoped that this first assessment of the remaining native vegetation of Yerba Buena Island will assist in the development of a Reuse Plan that recognizes the significance of the botanical resources on the island and provides for their preservation and ultimate enhancement. The transfer of Yerba Buena Island to the City of San Francisco offers a rare opportunity for the preservation of natural resources that have never been readily accessible to the general public, despite being situated in the center of a large metropolitan area.

## 1.0 INTRODUCTION

This report presents the results of a series of focused special-status plant surveys of the Navy controlled portion of Yerba Buena Island. Botanical Consulting Services (BCS) was retained by Tetra Tech, Inc. to conduct surveys of the Navy-controlled portion of the island and to assess the potential for occurrence of special-status plant species as part of the Treasure Island Base Realignment and Closure (BRAC) EIR/EIS. This report describes existing habitats within the study area, lists all potentially-occurring special-status plant species, and provides an assessment of their potential for occurrence onsite. A preliminary inventory of native and naturalized plant species detected during the surveys is provided in Appendices A and B, respectively.

## 2.0 GEOGRAPHIC LOCATION OF THE STUDY AREA

Yerba Buena Island is located in San Francisco Bay approximately one mile from downtown San Francisco (Figure 1). The island is connected to both San Francisco and Oakland/Emeryville by the San Francisco/Oakland Bay Bridge and falls within the County of San Francisco. The study area covers approximately 118 acres consisting only of that portion of the island that is currently controlled by the U.S. Navy (Figure 2). That portion of the island currently occupied by the U.S. Coast Guard (approximately 32 acres) was not included in this study. The present surveys included all undeveloped, non-landscaped areas.

## 3.0 SURVEY METHODS AND LIMITATIONS

To assist in the preparation of the Base Realignment and Closure EIR/EIS, a series of focussed plant surveys were conducted on the Navy controlled portion of Yerba Buena Island. A total of six surveys were performed by biologist Michael Wood of Botanical Consulting Services. Surveys were conducted in 1996 on 12 April, 22 April, 30 April, 13 May, 28 May, and 17 June. The primary objectives of the surveys were to prepare a preliminary inventory of all native and naturalized plant taxa occurring within Navy controlled portion of Yerba Buena Island and to assess the occurrence or potential for occurrence of special-status plant taxa.

A list of potentially-occurring special-status plant taxa was compiled through a review of the California Natural Diversity Data Base (CNDDDB) print-outs for the Oakland West, San Francisco North and San Francisco South USGS quads (CNDDDB 1996) and review of the California Native Plant Society's *Electronic Inventory of Rare and Endangered Vascular Plants of California* (Skinner and Pavlik 1995) and CNPS Yerba Buena Chapter's *Rare and Endangered Plants of San Francisco's Wild and Scenic Places* (Wood 1996). Additional information on plant taxa of botanical interest was compiled from the CNPS East Bay Chapter's *Unusual and Significant Plants of Alameda and Contra Costa Counties* (Lake 1995) and *Status of Rare, Threatened and Endangered Vascular Plants in Alameda and Contra Costa Counties (and some adjacent areas)* (Olson 1994). Jake Sigg, president of the CNPS Yerba Buena Chapter, was also consulted regarding the existing and potentially-occurring botanical resources of the island.

The entire study area was surveyed repeatedly throughout the spring and early summer flowering seasons. All surveys were conducted by foot and survey methods for special-status plant taxa conformed to California Department of Fish and Game guidelines (CDFG 1984). The entire

shoreline of the island was surveyed by boat on 28 May, 1996. All distinct plant communities were surveyed and characterized and all plant species detected were identified in the field or lab and recorded (Appendices A and B). Due to time constraints, only a limited number of voucher specimens could be collected and pressed; they will ultimately be housed at the California Academy of Sciences in San Francisco. Native plant communities were mapped in the field on 1"=40' scale CAD generated topographic maps provided by the Navy. Special-status plant taxa were mapped in the field and the population sizes estimated. California Native Species Field Survey Forms were completed for detected special-status plant taxa and are included in Appendix D. Other plant taxa of local botanical interest were also mapped in the field; they were not enumerated. A compilation of the distribution of plant communities and interesting botanical resources was prepared on a 1"=200' scale map (Figure 3). To aid in the mapping of plant communities a 1"=2000' scale black and white aerial photograph flown in 1970 (SCS 1991) and a 1"=2000' scale infra-red aerial photograph (no date, around 1990) were used.

Nomenclature used throughout this report conforms to Hickman (1993) for plants and Holland (1986) for vegetation communities; plant community descriptions conforming to Sawyer and Keeler-Wolf (1995) and Cowardin, *et al.*, (1979) are also given where appropriate. Nomenclature for special-status plant taxa conforms to that accepted by the CNDDDB and California Department of Fish and Game (CDFG).

Existing documentation reviewed includes *Land management plan: Naval support activity Treasure Island, San Francisco California* (DON 1979), *Treasure Island reuse plan: physical characteristics, building and infrastructure conditions* (ROMA, *et al.* 1995), *Draft environmental impact statement, San Francisco Ship Homeporting, Naval Station Treasure Island* (DON 1984), *Natural resources management plan, Treasure Island Naval Station* (DON 1986), *Base realignment and closure cleanup plan, Naval Station Treasure Island* (PRC 1994) and *Historical study of Yerba Buena Island, Treasure Island, and their buildings* (DON 1996),

Other literature reviewed includes *A Flora of San Francisco* (Howell, *et al.* 1958), *The vegetation cover of the San Francisco Bay region in the early Spanish period* (Clarke 1959), *Marin flora* (Howell 1970), *A flora of the San Bruno Mountains* (McClintock, *et al.* 1990), *A California flora and supplement* (Munz 1968), *Plants of Angel Island, Marin County, California* (Ripley 1980), *Plant Communities of Marin County* (Shuford and Timossi 1989) and *Flora of the Santa Cruz Mountains of California* (Thomas 1961).

#### **4.0 HISTORICAL AND EXISTING CONDITIONS**

Yerba Buena Island is situated in San Francisco Bay just across from the City of San Francisco. It is the most southern of three Bay islands including Angel Island to the north and Alcatraz to the northwest. Originally named "Isla de Alcatrazes" (Pelican Island) in 1775 by Juan Manuel de Ayala, it was renamed Yerba Buena Island by the English cartographer Captain Frederick W. Beechey in 1826, when he inadvertently applied that name to what is now known as Alcatraz. The name Yerba Buena comes from the fragrant mint (*Satureja douglasii*), which no longer can be found on the island. The island became known as "Goat Island" when it was used for goat grazing between 1837 and 1850. The goats were used to supply ships' crews with fresh meat. The name of the island was officially changed to Goat Island by the U.S. Geographic Board in 1895. Under pressure from the Native Daughters of the Golden West, the island's name was

changed back to Yerba Buena Island in 1931. Another unofficial name for Yerba Buena Island was "Wood Island", for the wood (primarily coast live oak) that was cut and supplied to sailing vessels. For an excellent history of Yerba Buena Island, see *Historical study of Yerba Buena Island, Treasure Island, and their buildings* (DON 1996).

#### **4.1 Historical Activities Affecting the Vegetation**

The vegetation of Yerba Buena Island has been subjected to a long history of human disturbance. Following colonization of the region by Europeans, grazing by free-roaming goat herds and harvesting of the native oak woodlands resulted in the virtual deforestation of the island (DON 1996). Other impacts to the island's ecosystems occurred while under private ownership from 1835 to 1867. During this period, several buildings were constructed, including a barn, stable, windmill, carpenter's shop, forge, and wharf. Oyster beds were farmed off the eastern side of the island and a quarry was established to supply building stone for San Francisco and ballast for ships. In 1867, the U.S. Army established a base on the island and assumed complete control of the island until its transfer to the Navy in 1898. During its occupation of the island, the Army established an artillery post and depot on the eastern edge of the cove, a lighthouse and buoy depot and a torpedo station.

In 1887, the military began replanting trees on the island as part of California's first Arbor Day. While most of these plantings on the ridge and hilltop did not survive due to the harsh weather and a fire, some of the trees planted at the lower elevations of the island are believed to have survived to this day. Additional plantings were made in 1900, 1902, 1908, 1917, 1939, 1944, and 1945 (DON 1996). There is no record of the tree species planted historically, but they are presumed to include the many horticultural trees found in the landscaped areas of the island and the surrounding groves of Tasmanian blue gum (*Eucalyptus globulus*). It is not known whether or not the coast live oak trees present today were included in these replanting efforts. However, the majority are presumed to be indigenous.

After taking control of Yerba Buena Island from the Army in 1898, the Navy established a Naval Training Station and built barracks for 500 men in the eastern cove (Figure 4). With the start of World War I, a major building project was begun on the island to substantially increase the capacity of the training facility. Canvas tents were erected in orderly rows along boardwalks throughout the eastern end of the island (Figures 5 and 6). The population of the Yerba Buena Island Naval Training Station reached a peak of 13,000 personnel during the war. In 1923, as a result of overcrowding, all Naval training facilities on Mare Island and Yerba Buena Island were transferred to San Diego. In the mid 1930s, many of the buildings on Yerba Buena Island were demolished because they had fallen into disrepair. Construction of the San Francisco - Oakland Bay Bridge was begun in 1933 and completed in 1936. With completion of the bridge, the Navy constructed Treasure Island which once again led to an increase of activity on Yerba Buena Island.

During World War II, Yerba Buena Island functioned as a Receiving Ship for the transfer of men to ships and bases, processing an average of 1,500 men per day. As the island became overcrowded, the Receiving Ship function was transferred to Treasure Island in 1946. In 1943, nearly seven acres of land area was added to the island by the filling of tidal area. After World War II, the U.S. Coast Guard became the primary tenant of the eastern side of Yerba Buena

Island. In 1966, apartment-style officers quarters were constructed on the north and west sides of the island.

Yerba Buena Island had two native American burial site and three colonial burial areas, none of which remain today (Figure 7). The native American burial sites were located on top of the island where the signal tower is located. The second burial site was located in the cove on the eastern side of the island. A cemetery was established in 1849 near the western end of Macalla Road near Treasure Island Road. The cemetery was relocated to the Presidio in 1938 prior to the opening of the Golden Gate International Exposition. Two other unofficial burial sites were located at the top of the island near the signal tower and west of the east point. Several species of native wildflowers, and four very large, old California buckeye trees, presumably relicts of the original vegetation, persist at the former cemetery site.

#### **4.2 Physical Features**

Yerba Buena Island covers a total of approximately 150 acres of mostly steep terrain reaching an elevation of 338 feet above mean sea level at its summit. Area under control of the Navy covers a total of approximately 118 acres. Habitats in the Navy's portion of the island are divided into intensively developed and maintained landscaped areas (58.2 acres), and undeveloped areas consisting of grassland (0.9 acre), eucalyptus woodland (28.9 acres), mixed woodland (9.4 acres) and brushland (20 acres)(DON 1986).

Yerba Buena Island is believed to have been uplifted by faulting along a branch of the Hayward fault around one million years ago. Geologically, the island is made up predominantly of consolidated sandstone and shale of the Franciscan formation. On the island, the Franciscan formation is covered with thin sandy deposits of the Pleistocene Colma formation (Blake, *et al.* 1974) or derived from the underlying Franciscan sandstone (Radbruch 1957). An area of artificial fill was placed at the northeastern tip of the island in 1943. Slopes on Yerba Buena Island range from 5 to 75 percent.

Soils on Yerba Buena Island are mapped as a complex of Candlestick (Pachic Argiustoll), Kron (Lithic Haplustoll), and Buriburi (Pachic Haplustoll) series on 30 to 75 percent slopes. The surface texture of these soils ranges from fine sandy loam to gravelly loam and reflect the underlying Franciscan sandstone bedrock. Native soils vary in thickness from ten to 40 inches in depth. The soils have been greatly altered by reshaping, grading, excavating and filling. Also present on the island are areas of Urban Land (developed or paved) and Orthents (SCS 1991).

The climate of Yerba Buena Island is influenced by its strong marine influence which is characterized by frequent morning and evening fog during the summer and strong prevailing winds through the Golden Gate. Precipitation falls primarily between the months of October and April and the average annual rainfall is 20 inches (SCS 1991). The average daily temperature is 57°F and the average annual frost-free period is 300 to 350 days. Relative humidity is lowest in the fall and ranges from 50 percent during the day to 70 percent during the night. The prevailing wind direction is from the northwest. Wind speed is less than six miles per hour more than 50 percent of the time and exceeds 12 miles per hour only ten percent of the time (DON 1986). The strongest winds are generally associated with winter storms.

Structures and facilities found within the study area include apartment-style officers quarters and residences, a radar station and radio tower, above ground reservoir tanks, warehouses, garages, playgrounds, vacant lots and abandoned structures, the Clipper Cove picnic area, landscaped areas, parking areas, and paved roadways.

### 4.3 Vegetation Communities

Seven distinct plant communities occur within the study area, four of which are dominated by native, presumably naturally occurring plant species. Native plant communities include Coast Live Oak Woodland, Central Coast Riparian Scrub, Northern (Franciscan) Coastal Scrub and Valley Wildrye Grassland. Highly altered plant communities dominated by non-native plant species include Eucalyptus Woodland, Non-native Scrub/Shrubland and Ruderal habitats.

The vegetation of Yerba Buena Island has been greatly altered by human activities. Grazing by goats in the mid 1800s probably resulted in the removal of many herbaceous grass and wildflower species from the island. Harvesting of wood for fuel and building is believed to have resulted in the loss of most of the native tree canopy on the island, which might have been substantial above Clipper Cove. The removal of the tree canopy would have severely disturbed the understory species. Grading for roads and building sites, excavation of rock quarries, and construction of buildings completely removed the vegetation from many areas. Invasive non-native species planted throughout the island have overgrown a majority of the undeveloped areas, placing even further pressures on the remaining native plant species.

Despite these historic impacts, Yerba Buena Island still supports some remarkable examples of what is presumed to be some of the island's original plant communities. Numerous native tree, shrub, herb and fern species, found in only limited numbers in San Francisco, are relatively abundant on the island. Native and non-native plant communities within the study area are described below.

#### Coast Live Oak Woodland

Coast Live Oak Woodland is typically found on north-facing slopes and shaded ravines in the southern portion of the state and on more exposed, mesic sites in the north. This community is dominated by coast live oak (*Quercus agrifolia*) which frequently occurs in pure, dense stands with a closed canopy. Coast Live Oak Woodland is restricted primarily to the coast side of the state and is distributed from Sonoma County to Baja California. It occurs throughout the outer South Coast Ranges and coastal slopes of the Transverse and Peninsular ranges, usually below 4,000 feet in elevation. This vegetation type conforms to the Coast Live Oak Series as classified by Sawyer and Keeler-Wolf (1995).

While oak woodland probably only covered a small portion of Yerba Buena Island, as was the case in San Francisco (Howell, *et al.* 1958; Clarke 1952), historical accounts of harvesting wood to supply ships indicates that oaks must have at one time been fairly abundant. Although the quality of the reproduction is poor, an aerial photograph taken in 1917 (Figure 7) shows abundant trees on the western and northern portions of the island, especially above Clipper Cove. Another photograph taken in 1917 (Figure 6) clearly shows abundant low oaks above the eastern cove. Oaks are still abundant in these areas today.

Very few tree and shrub species commonly associated with coast live oak woodland can still be found on Yerba Buena Island. These are limited to toyon (*Heteromeles arbutifolia*), blue elderberry (*Sambucus mexicana*), scattered California hazelnut (*Corylus cornuta* var. *californica*) and a few California buckeye (*Aesculus californica*). While much of the understory of the remaining coast live oak woodland is overgrown with native species such as poison oak (*Toxicodendron diversilobum*), California blackberry (*Rubus ursinus*), and California man-root (*Marah fabaceus*) and such non-native species as Tasmanian blue gum (*Eucalyptus globulus*), English ivy (*Hedera helix*), German ivy (*Sencio mikanioides*), Himalaya blackberry (*Rubus discolor*), and nasturtium (*Tropaeolum majus*), a relatively intact herbaceous understory is present at several locations. On the north-facing slope above Clipper Cove, the understory consists of a dense layer of poison oak and California blackberry along with abundant ferns such as western sword fern (*Polystichum munitum*), wood fern (*Dryopteris arguta*), California polypody (*Polypodium californicum*), and goldenback fern (*Pentagramma triangularis* var. *triangularis*).

On more exposed sites, the herbaceous understory commonly consists of such native species as poison oak, California man-root, oso berry, miner's lettuce (*Claytonia perfoliata*), bracken fern (*Pteridium aquilinum*), coast figwort (*Scrophularia californica*), common Pacific pea (*Lathyrus vestitus* var. *vestitus*), stinging phacelia (*Phacelia malvifolia*), fiesta flower (*Pholistoma auritum* var. *auritum*), rigid hedge nettle (*Stachys ajugoides* var. *rigida*), creeping ryegrass (*Leymus triticoides*) and American vetch (*Vicia americana*), among others. Dutchman's pipevine (*Aristolochia californica*) is also present in the oak understory at several locations within the study area.

Many species conspicuous in their absence from Coast Live Oak Woodland on Yerba Buena Island include California bay laurel (*Umbellularia californica*), holly-leaved cherry (*Prunus ilicifolia*), twinberry (*Lonicera involucrata*), California coffeeberry (*Rhamnus californica*), yerba buena (*Satureja douglasii*), and red-flowering currant (*Ribes sanguineum* var. *glutinosum*), among others.

### Central Coast Riparian Scrub

Central Coast Riparian Scrub typically consists of a scrubby, streamside, open to impenetrable thicket composed of any of several species of willows. This plant community occurs close to river channels and the coast on fine-grained sand and gravel bars with a high water table. It is distributed along and at the mouths of most perennial and many intermittent streams of the South Coast Ranges, from the Bay Area to near Point Conception (Holland 1986). Central Coast Riparian Scrub is generally regarded as early seral, meaning that it typically precedes the development of other riparian woodland or forest communities in the absence of severe flooding. However, outside of riparian situations, that is, near groundwater seeps, willow-dominated scrub is not considered seral. Onsite, Central Coast Riparian Scrub conforms to the Arroyo Willow Series as described in Sawyer and Keeler-Wolf (1995) and Palustrine shrub-scrub wetland as described in Cowardin, *et al.* (1976).

Within the study area, Central Coast Riparian Scrub is best developed at lower elevations of the steep, north-facing slope adjacent to Clipper Cove where the water table nears the surface. A

single stand is also present on the western edge of the island. This habitat type is dominated by arroyo willow (*Salix lasiolepis*) with lesser amounts of red willow (*Salix laevigata*). Together, these two species form a complete canopy supporting virtually no understory. Other native plant species commonly found within or immediately adjacent to Central Coast Riparian Scrub onsite include blue elderberry, California blackberry, and giant horsetail (*Equisetum telmateia* ssp. *braunii*). The non-native nasturtium and butterfly bush (*Buddleja davidii*) have become naturalized around the willows above Clipper Cove.

### Northern (Franciscan) Coastal Scrub

Northern Coastal Scrub consists of a dense cover of low shrubs up to six feet high with a well-developed herbaceous or low woody understory. It is frequently interspersed with Coastal Terrace Prairie grassland. Northern Coastal Scrub is best developed on windy, exposed sites with shallow, rocky soils. This vegetation community is distributed in a discontinuous strip from southern Oregon to Point Sur, Monterey County within the immediate coastal zone and at elevations up to 1,500 feet (Holland 1986; Holland and Keil 1990). The shrub canopy is typically dominated by one to several species such as coyote brush (*Baccharis pilularis*), California sagebrush (*Artemisia californica*) and yellow bush lupine (*Lupinus arboreus*). Within the study area, Northern Coastal Scrub corresponds to the California Sagebrush Series as classified by Sawyer and Keeler-Wolf (1995).

Within the study area, Northern Coastal Scrub is best developed in a continuous band along the steep bluffs on the islands western edge, mostly west of Treasure Island Road. Here, Northern Coastal Scrub shows a strong resemblance to Northern Dune Scrub both in terms of species composition and substrate. Relictual patches of Northern Coastal Scrub also occur inland of Treasure Island Road on the western side of the island and on the steep bluffs at the island's eastern-most point, below the Bay Bridge. The dominant species is California sagebrush. Common native species also occurring include yellow bush lupine, creeping ryegrass, California polypody, poison oak, coyote brush, coast figwort, seaside daisy (*Erigeron glaucus*), tall stephanomeria (*Stephanomeria virgata* ssp. *pleurocarpa*), lizard tail (*Eriophyllum staechnadifolium*), blue dicks (*Dichelostemma capitatum* ssp. *capitatum*), purple needlegrass (*Nassella pulchra*), leafy bentgrass (*Agrostis pallens*), yarrow (*Achillea millefolium*), sticky monkey-flower (*Mimulus aurantiacus*), California broom (*Lotus scoparius*), bluff lettuce (*Dudleya farinosa*), California poppy (*Eschscholzia californica*), pearly everlasting (*Anaphalis margaritacea*), Coast Range melic (*Melica imperfecta*), coast buckwheat (*Eriogonum latifolium*) and California brome (*Bromus carinatus* var. *carinatus*), among others.

Some characteristic species found in Northern Coastal Scrub in San Francisco but conspicuously absent on Yerba Buena Island include Douglas Iris (*Iris douglasii*), coast red onion (*Allium dichlamydeum*), California oatgrass (*Danthonia californica* var. *americana*), Nootka reed grass (*Calamagrostis nutkaensis*), checker lily (*Fritillaria affinis* var. *affinis*), june grass (*Koeleria macrantha*), sun cups (*Camissonia ovata*), coast angelica (*Angelica hendersonii*), hill morning-glory (*Calystegia subacaulis*), Indian paint brush (*Castilleja latifolia*), shooting star (*Dodecatheon hendersonii*), beach strawberry (*Fragaria chiloensis*), horkelia (*Horkelia californica*), checkerbloom (*Sidalcea malvaeflora* ssp. *malvaeflora*), and mule ears (*Wyethia angustifolia*), to name a few.

Invasive exotics that have naturalized on the island and currently pose a threat to the remaining Northern Coastal Scrub vegetation include sweet fennel, Tasmanian blue gum, French broom, ehrharta (*Ehrharta erecta*), Hottentot fig (*Carpobrotus edulis*), ox-eye daisy (*Argyranthemum foeniculaceum*), red valerian (*Centranthus ruber*), and several species of wattle (*Acacia* spp.), among others.

### Valley Wildrye Grassland

Valley Wildrye Grassland typically forms dense patches dominated by creeping ryegrass (*Leymus triticoides*). This plant community typically occurs on moist sites at low elevations, often adjacent to riparian or freshwater marsh habitat. Soils are frequently sub-alkaline and are seasonally inundated. In the San Francisco Bay Area, it also commonly occurs on clayey or sandy slopes near seeps or where the soil remains moist through spring and into the summer months. Valley Wildrye Grassland occurs widely throughout the Central Valley and surrounding foothills. This plant community conforms to Creeping Ryegrass Series as described by Sawyer and Keeler-Wolf 1995).

On Yerba Buena Island, Valley Wildrye Grassland appears to have developed relatively recently as a result of site modifications. It is best developed above the western shoreline near the intersection of Macalla Road and Treasure Island Road across from the Clipper Cove picnic area. Here, creeping ryegrass, giant ryegrass (*Leymus condensatus*) and smaller amounts of Vancouver's ryegrass (*Leymus xvancouverensis*) form a dense band on the bluffs above the Northern Coastal Scrub and extending into the eucalyptus trees. Valley Wildrye Grassland occurs on native soils along the bluffs and extends onto fill and over rip-rap lining the causeway linking Yerba Buena Island and Treasure Island. Creeping ryegrass is fairly abundant within the study area persisting in the eucalyptus understory at many locations.

### Eucalyptus Woodland

This non-native plant community has naturalized in California since eucalyptus trees were first brought to the state in the mid 1880s. Numerous species of the genus were imported for their horticultural interest and their potential utility as a fast-growing hardwood. Groves of eucalypts were first planted in the vicinity of Berkeley and later planted in groves throughout the Central Coast and into southern California. Because climatic conditions in the western half of the state are very similar to the range of many of the imported species of eucalypts in Australia, the planted groves managed to persist and spread without cultivation. It is estimated that there are between 600 and 800 species of *Eucalyptus*, about 18 of which have become fairly widespread in California. The most common and widely grown species is Tasmanian blue gum (*Eucalyptus globulus*). Due to the facts that the so-called gum trees form dense, expanding groves, drop a tremendous amount of bark and leaf litter, and greatly alter the chemistry of the soil, eucalypts have contributed to the loss of native plant communities which typically cannot persist in the understory. Eucalypts have had an especially adverse effect on the coastal scrub and coast grassland communities.

Within the study area, eucalyptus woodland is dominated by Tasmanian blue gum trees 60-80 feet in height and around 50 years of age. Eucalypts are the dominant tree feature on Yerba Buena Island, forming a more or less continuous band at the upper and middle elevations of the

island. Canopy coverage ranges from around 40 to 80 percent. The understory varies from ruderal, non-native herbs to relicts of the native Coast Live Oak Woodland, Northern Coastal Scrub and grassland communities. Because the eucalyptus groves are relatively young and the canopy has not yet closed completely, many native species are expected to have persisted. Native plant species relatively common beneath the incomplete eucalypt canopy include coast live oak, toyon, California polypody, California man-root, blue elderberry, poison oak, California blackberry, creeping ryegrass, wood fern, rigid hedge nettle, common montia, blue dicks, soap plant (*Chlorogalum pomeridianum* var. *divaricatum*), and morning-glory (*Calystegia purpurata* ssp. *purpurata*), among others.

### Non-native Scrub/Shrubland

Non-native Scrub/Shrubland consists of ruderal non-native garden escapes that have become naturalized primarily on disturbed sites. This plant community coincides and in many cases overlaps with Eucalyptus Woodland. It is dominated by French broom and includes butterfly bush, Tasmanian blue gum, sweet fennel, green wattle (*Acacia decurrens*), golden wattle (*Acacia longifolia*), myoporum (*Myoporum laetum*), and Australian tea tree (*Leptospermum laevigatum*), among others.

### Ruderal

Ruderal habitat is that from which the native vegetation has been completely removed by grading, cultivation, or other surface disturbances. Such areas, if left fallow, will become recolonized by invasive exotic species as well as native species; the native vegetation may ultimately become at least partially restored if there is no further disturbance.

Numerous portions of the study area presently support habitat that has been significantly altered by grading, construction and road building. This is especially evident on the eastern point of the island where the original grassy knoll was graded flat (see Figure 4), along most of the eastern portion of Macalla Road, and at the former cemetery site at the west end of Macalla Road. The native vegetation in these areas was completely removed and has been mostly replaced by non-native ruderal (weedy) plant species. At the former cemetery location, however, abundant native annual wildflowers have recolonized the site.

Dominant invasive non-native plant species occupying ruderal sites on Yerba Buena Island include

various brome grasses (*Bromus* spp.), sweet fennel (*Foeniculum vulgare*), wild radish (*Raphanus sativus*), black mustard (*Brassica nigra*), Italian ryegrass (*Lolium multiflorum*), french broom (*Genista monspessulana*), wild oats (*Avena fatua*), storkbill (*Erodium* spp.), bur-clover (*Medicago polymorpha*), dog mayweed (*Anthemis cotula*), Italian thistle (*Carduus pycnocephalus*), sweet clover (*Melilotus* spp.), and mallow (*Malva* spp.), among others.

## **4.4 Special-status Plant Taxa**

Certain plants are designated as "special-status" taxa due to their overall rarity, endangerment, restricted distribution, and/or unique habitat requirements. In general, it is a combination of these factors that leads to the designation of a species as sensitive. The Endangered Species Act

(ESA), enacted by Congress in 1973, outlines the procedures whereby species are listed as endangered or threatened and establishes a program for the conservation of such species and the habitats in which they occur. Many individual states have enacted their own listing procedures to provide for the protection of additional locally sensitive biological resources. The California Endangered Species Act of 1984 amends the California Fish and Game Code to protect species deemed to be locally endangered and essentially expands the number of species protected under the ESA.

Special-status plant species include those officially listed as endangered, threatened, or rare by the U.S. Fish and Wildlife Service (USFWS 1994a; 1994b) and the California Department of Fish and Game (CDFG 1994; 1996), as well as assigned to various lists compiled by the California Native Plant Society (CNPS) (Skinner and Pavlik 1995). The CNPS lists are sanctioned by the CDFG and serve essentially as their list of "candidate" plant species. The CDFG generally requires that all taxa on CNPS lists 1B and 2 be addressed in CEQA documents and recommends that taxa on CNPS lists 3 and 4 be considered.

Based on a review of the CNDDB (1996), Skinner and Pavlik (1995) and Wood (1996), a total of 41 special-status (or proposed for special status) plant taxa were determined to have some potential for occurring in the project vicinity. A summary of the status, habitat affinities, reported localities in the project area, blooming period, and potential for occurrence onsite for each of the target plant species is presented in Table 1.

Of the 41 target special-status plant taxa one, dune gilia (*Gilia capitata* ssp. *chamissonis*), was recorded during the surveys and another, San Francisco lessingia (*Lessingia germanorum*), was determined to have a moderate potential for occurrence onsite. Dune gilia and San Francisco lessingia are described, below. Of the remaining 39 special-status taxa, 13 taxa were determined to have a low potential for occurrence within the study area because suitable or marginally suitable habitat is present and/or they could have been overlooked. These taxa include leaf daisy (*Erigeron foliosus* var. *franciscensis*), Santa Cruz tarplant (*Holocarpha macradenia*), beach layia (*Layia carnosae*), marsh microseris (*Microseris paludosa*), San Francisco wallflower (*Erysimum franciscanum*), San Francisco campion (*Silene verecunda* ssp. *verecunda*), curly-leaved monardella (*Monardella undulata*), fragrant fritillary (*Fritillaria liliacea*), Michael's rein orchid (*Piperia michaelii*), many-stemmed gilia (*Gilia millefoliata*), large-flowered linanthus (*Linanthus grandiflorus*), San Francisco Bay spineflower (*Chorizanthe cuspidata* var. *cuspidata*) and Kellogg's horkelia (*Horkelia cuneata* ssp. *sericea*). The remaining 26 taxa are not considered to have any potential for occurrence onsite due to a lack of suitable habitat or the fact that they would have been readily detectable during the surveys.

## Dune Gilia

Dune gilia is a low annual herb in the phlox family. It has pinnately lobed leaves with a skunk-like odor. It produces bright blue-violet flowers up to one half inch across from May through July. Dune gilia is restricted to coastal sand hills from San Francisco to Bodega Bay. Although it was once very common on the San Francisco dunes, it is now restricted to three locations in the Presidio near Baker Beach and one location in the Sunset District. Dune gilia is also recorded on the Point Reyes Peninsula and Angel Island, Marin County.

Although dune gilia does not currently have any status as a special-status plant, it is being evaluated for addition to the CNPS List 1B:3-3-3. This status indicates that the subspecies is rare and endangered in California, its occurrence is limited to only a few highly restricted populations, is endangered throughout its range and is endemic to California. In the *Flora of San Francisco* (Howell, *et al.* 1958), dune gilia is described as "one of San Francisco's most attractive flowering plants (p. 114)."

## San Francisco Lessingia

San Francisco lessingia is an annual herb in the daisy family. It forms a low crown of thin, interwoven branches with entire to pinnately lobed and toothed leaves up to one inch long. Inflorescences are mostly solitary, up to one half inch high and consisting of deep yellow disk flowers with a reddish-brown band in the throats. Flowering generally occurs from August through November although it sometimes begins as early as July. San Francisco lessingia is restricted to coastal scrub in openings on sandy flats and remnant dunes. It is known from only five natural occurrences (four in the Presidio and one in Daly City). It has been reintroduced at a sixth location in the Presidio. Historically, San Francisco lessingia is only known from San Francisco and San Mateo counties.

San Francisco lessingia is both listed as an endangered species by the state of California and has been proposed for listing as endangered by the USFWS. It is on the CNPS's List 1B:3-3-3. Although San Francisco lessingia was not detected during focussed surveys of Yerba Buena Island, abundant highly suitable habitat is present on the island's western edge. Due to the steepness of the bluffs and the timing of the survey, it is possible that the species could have been overlooked. For these reasons, it is considered to have a moderate potential for occurrence within the study area.

### **4.5 Botanically Significant Resources**

Botanically significant resources detected on the Navy-controlled portion of Yerba Buena Island consist of plant taxa and communities that represent relicts of what is presumed to be the original vegetation of the island. These remnants are considered botanically significant for historical reasons as well as the fact that they might provide a source of genetically appropriate propagules for restoration activities in the City of San Francisco. The original flora of Yerba Buena Island is believed to have been very similar to portions of the City, supporting identical habitats with a similar suite of species. In addition, some of the plant taxa found on Yerba Buena Island occur in

only a few locations in San Francisco and/or occur very infrequently in the Bay Area (Lake

1995; Olson 1994). A brief discussion of these resources is presented, below.

### California Buckeye

California buckeye (*Aesculus californica*) is a widely distributed tree found from northern California through the southern Central Coast and throughout the Sierra foothills. Although not restricted in any sense of the word, California buckeye represents an historical resource on the San Francisco Peninsula. In the late 1700s, the species was recorded as being widespread in the northeastern part of San Francisco and it is believed to have been prominent on Yerba Buena Island. It was used widely for fuel and by the late 1800s was limited only to the bay-side bluffs in the southern parts of the City. Only a single naturally occurring tree was left in San Francisco when the *Flora of San Francisco* was published in 1958. On Yerba Buena Island, a clump of four large individuals of California buckeye are still present beside Macalla Road at the site of the former cemetery. These large specimens might represent the last naturally occurring individuals in the study area. If native, these trees could provide a great amount of seed for restoration projects on the island as well as in the City.

### Coast Live Oak

As with the California buckeye, coast live oak (*Quercus agrifolia*) is widely distributed throughout the state. It too, was nearly eliminated from San Francisco and Yerba Buena Island by harvesting for fuel and building materials. Indigenous specimens still occur throughout San Francisco although their numbers have dwindled. Yerba Buena Island is believed to have once supported fairly large areas of coast live oak. Remnants of these populations can still be found on the north side of the island, primarily overlooking Clipper Cove. Low growing forms of coast live oak can be found along the island's western and southern bluffs. Oak woodlands still support abundant native annual flowers and ferns (see Section 4.3, above). Although seedlings of coast live oak were detected, the future of oaks on Yerba Buena Island is tenuous. At most locations, the trees are being overgrown by eucalyptus and native and non-native vines. Without control of these more aggressive species, reproduction would be expected to cease and mature trees will eventually succumb as a result of shading. Preservation of the oak woodlands should be made a priority issue for the reuse of Yerba Buena Island.

### Common Montia

Common montia (*Claytonia exigua* ssp. *exigua*) is a densely tufted glaucous annual in the purslane family (Portulacaceae). It produces fleshy, lanceolate bright green leaves to three inches long. Flowers are inconspicuous, white to pinkish and appear from February through April. Common montia is widespread, occurring from the northwest through the Central Coast, in the Central Valley and Sierra foothills. In San Francisco, it was not widely recorded historically, but has been recorded recently from the Presidio. It is widespread in Marin County (not on Angel Island) and in the Santa Cruz Mountains, but has not been recorded on San Bruno Mountain. In the East Bay, it is recorded from eight locations and is on the CNPS East Bay Chapter's rank "B" list (Lake 1995). On Yerba Buena Island, common montia was found at a single location among the oaks above the bluffs on the island's western edge.

### Dutchman's Pipevine

Dutchman's pipevine (*Aristolochia californica*) is an interesting vine belonging to its own family (Aristolochiaceae). It produces a tubular, U-shaped, purplish calyx that functions as its flower. Flowers develop January through April and they are pollinated by fungus gnats. Dutchman's pipevine occurs along streamsides, in woodlands and chaparral and it is distributed from northern California to the South Coast Ranges and from the San Francisco Bay to the Sacramento Valley and northern and central Sierra foothills. In San Francisco, it is now only found beneath coast live oaks on Strawberry Hill in Golden Gate Park and along Brotherhood Way near Lake Merced. It is also uncommon on San Bruno Mountain and has been reported from the Santa Cruz Mountains. In the East Bay, Dutchman's pipevine is restricted to small populations at approximately 12 to 14 locations. It is on the CNPS East Bay Chapter's rank "B" list due to the limited number and small size of the populations (Lake 1995). Within the study area, six populations of the species were located (see Figure 3). Dutchman's pipevine is the larval host plant for the pipevine swallowtail butterfly (*Battus philenor*).

### Fiesta Flower

Fiesta flower (*Pholistoma auritum* var. *auritum*) is an annual member of the waterleaf family (Hydrophyllaceae). It forms a dense mat of fragile, fleshy stems beneath oaks and on streambanks throughout California. It produces abundant, very attractive pale to deep blue flowers from March through May. Fiesta flower once occurred on Bayview Hill in San Francisco and in the southern part of the City but has not been recorded recently. In Marin County, the variety has only been recorded on Angel Island. In the East Bay, fiesta flower is recorded from seven locations and is on the CNPS East Bay Chapter's rank "B" list (Lake 1995). It is uncommon on San Bruno Mountain but relatively abundant in the Santa Cruz Mountains. On Yerba Buena Island, fiesta flower is fairly abundant, forming a dense carpet beneath the oaks above the bluffs at the western edge of the island and at several additional locations (Figure 3).

### Large-flowered Sand-spurrey

Large-flowered sand-spurrey (*Spergularia macrotheca* var. *macrotheca*) is a low, mat-forming perennial in the pink family (Caryophyllaceae). It produces linear, glandular-pubescent, fleshy leaves to one and one half inches long. Flowers are mostly pink, attractive and diminutive, and can appear year round. The variety occurs near salt marshes and on sea bluffs from British Columbia to Baja California. In San Francisco, large-flowered sand-spurrey is recorded as being common on ocean bluffs and flats and occasional on open grassy hillsides. Today, it is only known from the Presidio and near the Cliff House. It occurs occasionally near the coast and Bay of Marin County, including Angel Island, and in San Mateo County. In the East Bay, the variety is known from seven locations and is on the CNPS East Bay Chapter's rank "B" list (Lake 1995). On Yerba Buena Island, large-flowered sand-spurrey persists as dense clumps on otherwise barren sandstone, occurring just above the high tide line and below the scrub vegetation on the north side of the east point and on the western edge of the island.

### Oso Berry

Oso berry (*Oemleria cerasiformis*) is shrub or small tree in the rose family (Rosaceae). It produces elliptic dark green leaves up to five inches long and blue-glaucous bean-shaped fruits about an inch long. Flowers are white, fragrant and appear February through April. It is widespread in California, occurring from northern California to Baja California and throughout the southern and central San Joaquin Valley. Oso berry was once abundant in San Francisco, but is now restricted to small populations in the Presidio, on Mt. Davidson, Bayview Hill, Tank Hill, Twin Peaks, O'Shaughnessy Avenue, McLaren Park, Laguna Honda and Golden Gate Park. It is widely distributed in Marin County, including Angel Island, on San Bruno Mountain and the Santa Cruz Mountains. It is also widely distributed in the East Bay. Oso berry was included in this discussion because of the large number of plants found of Yerba Buena Island, the high restoration potential for its habitat and their suitability as a potential seed source for other restoration efforts in San Francisco.

### Stinging Phacelia

Stinging phacelia (*Phacelia malvifolia*) is an erect annual in the waterleaf family (Hydrophyllaceae). It is a freely branching, glandular hispid plant forming dense patches like fiesta flower. The two species often co-occur, occupying the same habitats. Stinging phacelia develops a dense cover of dull white flowers from April through July. It was once fairly widespread in San Francisco, but is now restricted to small populations in the Presidio, Lobos Creek, on Strawberry Hill in Golden Gate Park, at Grandview Park and at O'Shaughnessy Avenue. It is relatively common in Marin County, including Angel Island, and in the Santa Cruz Mountains and occasional on San Bruno Mountain. In the East Bay, stinging phacelia is restricted to a single location on Albany Hill and questionably in Emeryville. Due to its restricted occurrence in Contra Costa County, it is on the CNPS East Bay Chapter's rank "A-1" list (Lake 1995).

### Toyon

As with California buckeye and coast live oak, toyon (*Heteromeles arbutifolia*) is a very common, widespread species. It is a hardy shrub or small tree reaching 30 feet in height. It occurs in chaparral and oak woodlands below 4,000 feet in elevation throughout coastal California and the foothills. Toyon is common in San Mateo, Marin and Contra Costa counties. It is well known for the bright red bunches of berries it produces around Christmas time. In San Francisco, it was described as occurring occasionally at Fort Point, Lone Mountain, Golden Gate Park and Lake Merced. Although toyon is still fairly common in San Francisco, there are very few large, mature individuals remaining. On Yerba Buena Island, numerous large, old toyon "trees" can still be found. Some especially statuesque specimens occur among the oaks above Clipper Cove. These old individuals should be managed and preserved along with the coast live oak trees.

### Yellow Bush Lupine

Yellow bush lupine (*Lupinus arboreus*) is a medium-sized perennial shrub in the pea family. It is a very attractive component of the Northern Coastal Scrub and dune communities, occurring

naturally near the coast from Ventura to Sonoma counties and has naturalized further north. It produces abundant, large spikes of bright yellow flowers from March through June. In San Francisco, yellow bush lupine is listed as being common and widespread (Howell, *et al.* 1958). Although it is still widespread in the City, habitat for yellow bush lupine is being rapidly lost to invasive exotics. The species is common in Marin County, including Angel Island and in San Mateo County. In the East Bay, yellow bush lupine is restricted to the islands off Point Richmond and possibly Alameda and Berkeley. It is on the CNPS East Bay Chapter's rank "A-1" list (Lake 1995) due to its occurrence in limited and threatened habitats.

## 5.0 CONCLUSIONS

Although no state- or federally-listed endangered, threatened or rare plant taxa were detected during these surveys, numerous plant taxa of botanical significance were found. Perhaps of greatest interest was the detection of numerous populations of dune gilia. Within San Francisco, dune gilia occurs at several locations in the Presidio and one location in the Sunset District on Hawk Hill. It is also present on Angel Island. Dune gilia is currently being considered for addition to the California Native Plant Society's List 1B.

Other taxa of botanical interest detected include Dutchman's pipe, large-flowered sand-spurrey, yellow bush lupine, stinging phacelia, fiesta flower, common montia and oso berry. In addition, Yerba Buena Island supports numerous mature individuals of what are presumed to be indigenous coast live oaks, some very large toyons and California buckeye. The presence of all of these species may represent a valuable biological resource not only because they represent relicts of the original flora of the island but because they could provide an important genetic resource for future habitat restoration efforts on the island and the San Francisco Peninsula as well.

Several excellent examples of some of the San Francisco Peninsula's original vegetation are still present on Yerba Buena Island. Of special interest are stands of Northern (Franciscan) Coastal Scrub and Coast Live Oak Woodland. These vegetation types are similar to remaining stands still found in the City of San Francisco and are probably more closely related to the indigenous flora of San Francisco than any other land mass bordering the Bay.

Some of these native plant communities are remarkably intact and may represent a valuable genetic resource. Several plant taxa found on Yerba Buena Island occur in only limited numbers in San Francisco, making them a potential source of propagules for restoration efforts on the mainland. There is a very high potential for the restoration of native oak and scrub plant communities on the island. Numerous volunteer habitat restoration efforts are already underway in San Francisco and there is strong public support for such programs. Volunteer work parties on Angel Island have been very successful in reclaiming natural habitats threatened or degraded by invasive non-native plants.

It is strongly recommended that the restoration and preservation of these native plant communities be incorporated in the island's reuse plan. The transfer of Yerba Buena Island to the City of San Francisco offers a rare opportunity for the preservation of natural resources that have never been readily accessible to the general public, despite being situated in the center of a large metropolitan area. Hundreds of thousands of people pass through or near Yerba Buena Island

every day yet very few are familiar with the island's spectacular views and scenery. Even fewer are aware that the island offers a fascinating glimpse into the past, to a time when the island's vegetation was still intact.

This work represents perhaps the first detailed assessment of the flora of Yerba Buena Island. Because the island has been under control of the military, it has not been readily accessible to botanists for over 100 years. Yerba Buena Island could not be surveyed during preparation of the *Flora of San Francisco* (Howell, *et al.* 1958) and as a result, was not included in the flora. No recent or historical survey of the plants of Yerba Buena Island has ever been published.

## 6.0 LITERATURE CITED

- Blake, M.C., Jr., Bartow, J.A., Frizzell, V.A., Schlocker, J., Sorg, D., Wentworth, C.M., and R.H. Wright. 1974. *Preliminary Geologic Map of Marin and San Francisco Counties and Parts of Alameda, Contra Costa, and Sonoma Counties, California*. U.S. Geological Survey, Miscellaneous Field Studies Map MF-574. Reprinted 1985. Scale 1:63,360.
- California Department of Fish and Game (CDFG). 1984. *Guidelines for assessing the effects of proposed developments on rare and endangered plants and plant communities*. The Resources Agency, Sacramento.
- California Department of Fish and Game (CDFG). 1994. *Endangered, threatened, and rare plants of California*. Natural Heritage Division, Endangered Plant Program. November.
- California Department of Fish and Game (CDFG). 1996. *Special Plants List*. Natural Heritage Division, Natural Diversity Data Base. January.
- California Natural Diversity Data Base (CNDDB). 1996. *Data base print-out for the Oakland West and San Francisco North quads*. April.
- Clarke, William C. 1952. *The vegetation cover of the San Francisco Bay region in the early Spanish period*. Unpublished dissertation. 220 pp.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of wetlands and deepwater habitats of the United States*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 131 pp.
- Hickman, J.C. 1993. *The Jepson manual: higher plants of California*. University of California Press, Berkeley, California. 1400 pp.
- Holland, R. 1986. *Preliminary descriptions of the terrestrial natural communities of California*. California Department of Fish and Game, The Resources Agency. 156 pp.
- Holland, V.L. and D.J. Keil. 1990. *California vegetation*. Calif. Polytechnic State University, San Luis Obispo. 4th edition. 318 pp.
- Howell, J.T. 1970. *Marin flora*. University of California Press, Berkeley, California. 366 pp.
- Howell, J.T., P.H. Raven, and P. Rubtzoff. 1958. *A flora of San Francisco, California*. Univ. of San Francisco. 157 pp.
- Lake, D. 1995. *Unusual and significant plants of Alameda and Contra Costa counties*. Fourth Edition. California Native Plant Society, East Bay Chapter. March 1.
- McClintock, E., P. Reeberg, and W. Knight. 1990. *A flora of the San Bruno Mountains*. California Native Plant Society, Sacramento. Special Publ. No. 8. 223 pp.
- Munz, P.A. 1968. *A California flora and supplement*. University of California Press, Berkeley, California. 1681 pp.

- Olson, B.L. 1994. *Status of rare, threatened and endangered vascular plants in Alameda and Contra Costa counties (and some adjacent areas)*. Third Edition. California Native Plant Society, East Bay Chapter, Rare Plant Committee. March 1.
- PRC Environmental Management, Inc. (PRC). 1994. *Base realignment and closure cleanup plan, Naval Station Treasure Island*. March.
- Radbruch, D.H. 1957. *Areal and engineering geology of the Oakland West quadrangle, California*. U.S. Geological Survey, Misc. Geologic Investigations Map I-239. Scale 1:24,000.
- Ripley, J.D. 1980. *Plants of Angel Island, Marin County, California*. Great Basin Naturalist 40(4):385-407.
- ROMA Design Group, et al. (ROMA). 1995. *Treasure Island reuse plan: physical characteristics, building and infrastructure conditions*. June.
- Sawyer, J.O. and T. Keeler-Wolf. 1995. *A manual of California vegetation*. California Native Plant Society, Sacramento. 471 pp.
- Shuford, W.D. and I.C. Timossi. 1989. *Plant Communities of Marin County*. California Native Plant Society, Sacramento. 32 pp.
- Skinner, M.W. and B.M. Pavlik. 1995. *Electronic inventory of rare and endangered vascular plants of California*. Fifth ed. update. California Native Plant Society, Sacramento, California.
- Soil Conservation Service (SCS). 1991. *Soil survey of San Mateo County, Eastern part, and San Francisco County*. U.S. Department of Agriculture.
- Thomas, J.H. 1961. *Flora of the Santa Cruz Mountains of California*. Stanford University Press. 434 pp.
- U.S. Department of the Navy (DON) 1979. *Land management plan: Naval support activity Treasure Island, San Francisco California*. Western Division Naval Facilities Engineering Command.
- U.S. Department of the Navy (DON). 1984. *Draft environmental impact statement, San Francisco Ship Homeporting, Naval Station Treasure Island*. Western Division Naval Facilities Engineering Command. June.
- U.S. Department of the Navy (DON). 1986. *Natural resources management plan, Treasure Island Naval Station*. Natural Resources Management Staff, Western Division Naval Facilities Engineering Command. May.
- U.S. Department of the Navy (DON). 1996. *Historical study of Yerba Buena Island, Treasure Island, and their buildings*. Mare Island Naval Shipyard, Environmental Technical Division. September.
- U.S. Fish and Wildlife Service (USFWS). 1993. *Plant taxa for listing as Endangered or Threatened species; Notice of review*. 50 CFR part 17. September 30.
- U.S. Fish and Wildlife Service (USFWS). 1994a. *Endangered and threatened wildlife and plants*. 50 CFR 17.11 & 17.12. August 20.
- U.S. Fish and Wildlife Service (USFWS). 1994b. *Endangered and threatened wildlife and plants; animal candidate review for listing as endangered or threatened species; proposed rule*. 50 CFR part 17. November 15.
- Wood, M. 1996. *Rare and endangered plants of San Francisco's wild and scenic places*. California Native Plant Society, Yerba Buena Chapter. February.