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BAIR ISLAND RESTORATION AND MANAGEMENT PLAN: EXISTING BIOLOGICAL CONDITIONS

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INTRODUCTION

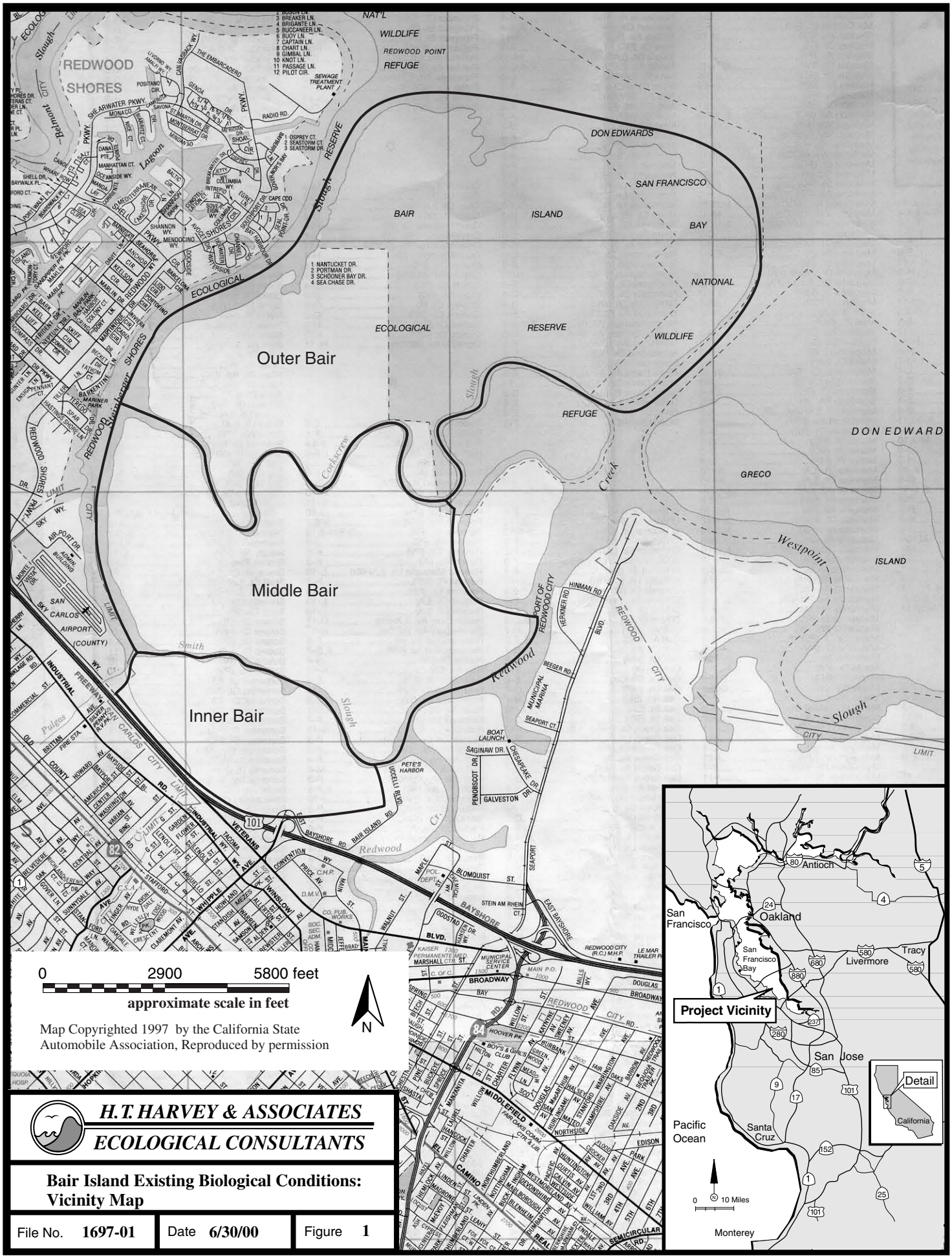
Bair Island is a former tidal salt marsh that is located adjacent to the San Francisco Bay in Redwood City, San Mateo County, California (Figure 1). Due to considerable natural and anthropogenic changes, the Bair Island complex consists of a mosaic of habitats, including tidal salt marsh, mud flats, seasonal wetlands, former diked salt ponds and uplands created from the disposal of dredged material. Bair Island is divided into three distinct areas separated by slough channels: Inner, Middle and Outer Bair (Figure 1). Inner Bair Island is connected to the mainland and can be directly accessed via Whipple Avenue. It is separated from Middle Bair by Smith Slough, which in turn is separated from Outer Bair by Corkscrew Slough (Figure 1). The project boundary for the purposes of the Restoration and Management Plan encompass the majority of Bair Island, with the exception of a portion of Middle Bair Island in the vicinity of Deepwater Slough (Figure 1). The habitats (and acreages) discussed in this document pertain only to those areas within the specified project boundaries.

Bair Island has been the target of numerous development proposals through the years, which were all rejected. The California Department of Fish and Game (CDFG) and the Refuge both acquired portions of Bair Island over time. In 1997, the Peninsula Open Space Trust (POST) purchased the remaining portions of Bair Island and turned over their interests in the property to these agencies. The San Carlos Airport also retains a portion of Inner Bair Island as a safety zone. In addition, two easements exist on Bair Island for both the PG&E towers and transmission lines that run throughout the Bair Island complex, as well as for the South Bay System Authority (SBSA) force main that runs underneath most of the southern part of the levee on Inner Bair.

Historically Bair Island was part of a large complex of tidal marshes and mud flats (Figure 2) within the drainage of Bay and Belmont Sloughs (PWA 2000). Bair Island was diked in the late 1800's and early 1900's for agricultural practices including cattle grazing. Bair Island was converted to salt evaporation ponds by Leslie Salt Company starting in 1946, and remained in production until 1965. The lands were drained and eventually sold to a series of real estate development companies. An EIR was prepared in 1981 for the South Shores Concept Plan that proposed development of Inner and part of Middle Bair Island (EIP 1981). A local referendum in Redwood City finally halted development plans for Bair Island. POST purchased Bair Island in 1997.

This site is a large, restorable complex of former salt evaporators, and has been a major priority for addition to the Refuge since the original boundaries were drawn. The restoration of tidal habitats at Bair Island is ecologically important to South San Francisco Bay. Following restoration, Bair Island will become an integral part of the extensive wetland complex within the Don Edwards San Francisco Bay National Wildlife Refuge (Refuge) and adjacent state and privately owned wetlands.

The goal of the restoration design will be to provide a plan that allows for passive restoration of Bair Island, thereby minimizing management needs in the future, but still provide critical salt marsh habitat for endangered species such as the California clapper



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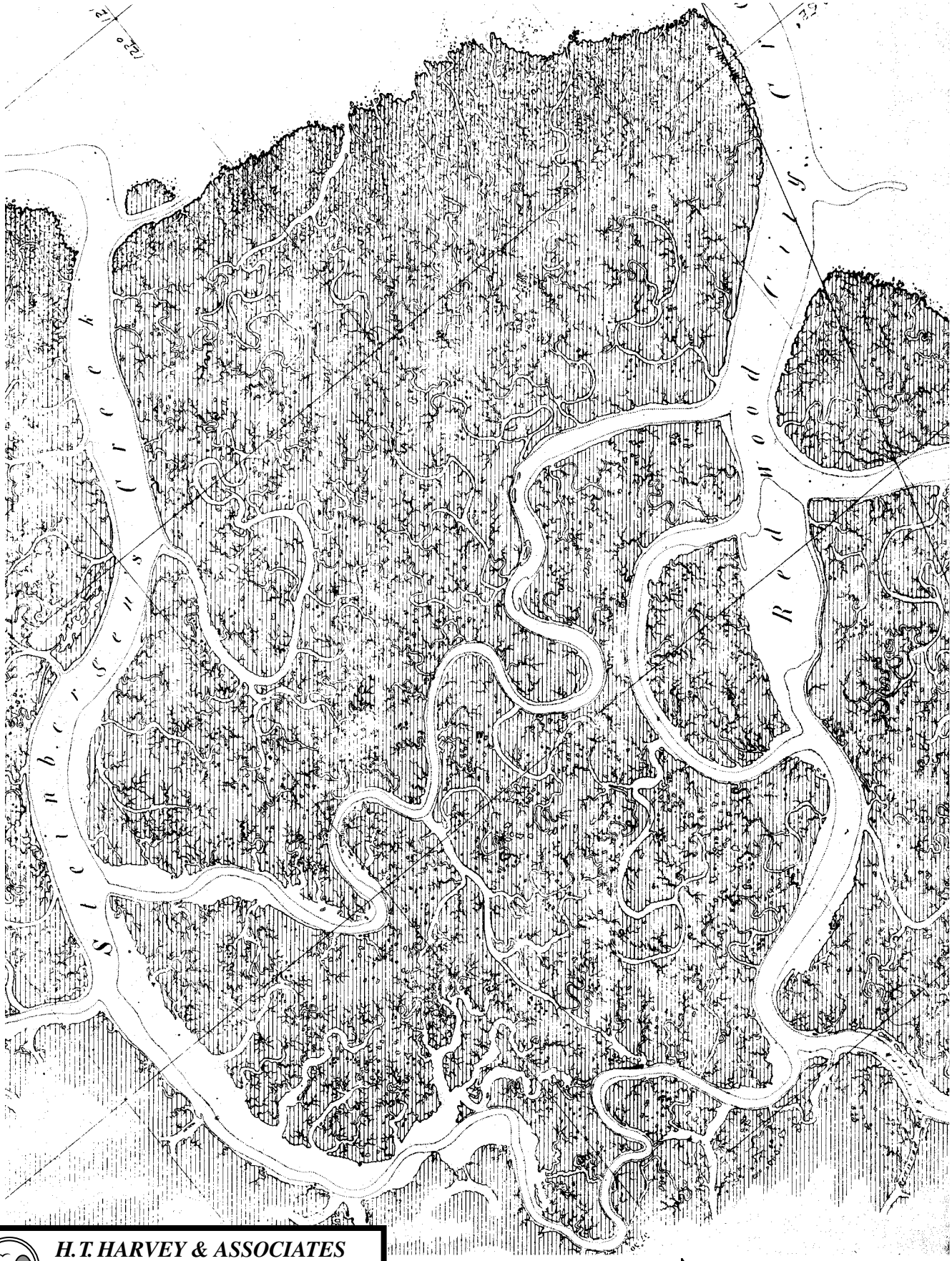
Bair Island Existing Biological Conditions: Vicinity Map

File No. **1697-01**	Date **6/30/00**	Figure **1**



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Bair Island Existing Biological Conditions:
U.S. Coast Survey 1857

File No. **1697-01**	Date **6/30/00**	Figure **2**

N

0 2000 4000 feet

approximate scale

rail (*Rallus longirostris obsoletus*) and salt marsh harvest mouse (*Reithrodontomys raviventris raviventris*). This site can assist with the preservation and perhaps recovery of both species once properly restored.

The purpose of this document is to assess and map the existing biological conditions of the Bair Island complex. Other existing conditions reports include the existing hydrological conditions prepared by Philip Williams & Associates (Philip Williams & Associates 2000). This study will provide a baseline of information that can be used to develop management objectives, evaluate the opportunities and constraints and provide alternatives to restoring tidal marsh habitat within Bair Island.

EXISTING BIOLOGICAL CONDITIONS

Using aerial photography, existing site conditions were mapped in detail. These include the mapping of habitat types (open water, diked salt marsh, etc.) and wildlife use (determined from both existing information and from a general survey by H. T. Harvey & Associates' wildlife biologists). As part of the habitat mapping a wetland assessment was conducted, which is an important part of understanding potential impacts to existing regulated resources from restoration activities and will likely be necessary during the permit phase.

SURVEY METHODS

Study Area

Bair Island consists of three sub-areas: Inner, Middle and Outer Bair. These areas are separated by slough channels, with only Inner Bair accessible without the use of a boat (Figure 1).

Aerial Photography and Orthorectification

Towill, Inc. acquired the aerial photography in February 2000. Black-and-white, vertical, stereo photography covering the project area and suitable for preparation of digital orthophotography at a scale of 1 inch = 200 feet was acquired at an altitude of 12,000 feet above the mean elevation of the terrain (AMT), resulting in an average scale of 1:24,000 (1 inch = 2000 feet). The photography consists of one line with four exposures (three stereo models) and was acquired during low tide.

Upon completion of the ground (photo) control survey and acquisition of aerial photography, analytical aerotriangulation was performed to extend control throughout the project photography and achieve a network of points sufficient to orient all stereo models. A simultaneous least squares block (bundle) adjustment was performed to obtain final control coordinates.

A black and white digital orthophotography of the project area at a scale of 1 inch = 200 feet with a pixel ground resolution of 1.0 foot (200 pixels per inch) was prepared. Orthophotos cover the entire project area, including perimeter tidal sloughs. Final orthophotos were subdivided into ten (10) conveniently sized tiles. Rectified imagery was clipped at the project limits. The orthophotography was geo-referenced to the project horizontal datum (CCS, Zone 3 NAD 83).

Habitat Mapping and Area Calculations

Field surveys followed a protocol that began with mapping habitat types onto clear acetate overlays placed directly over the digital images of the orthorectified B/W photos. Topographic features, marsh boundaries, and tentative habitat types (based on gray-scale signatures) were mapped in the office prior to field visits. Extensive ground-truthing of the preliminary mapping was then conducted during site visits to the entire Study Area conducted from 14 April to 28 April 2000. Marshes were observed primarily from levee trails, unimproved salt pond levees and Pacific Gas and Electric (PG&E) walkways. Due to lack of access to the interior of most sections of Bair Island, mapping of miscellaneous open water bodies in the interior of individual ponds was not possible. Where possible and when absolutely necessary, habitat types on the interior of the former salt ponds were verified by walking into areas that were not clearly visible from adjacent levees and upland areas.

The field vegetation maps (acetate overlays) were then scanned and electronically digitized. The maps were then overlaid on the digital orthos images. Plant association acreages and color-coded figures for the entire Study Area were generated in GIS (Microstation and ARCVIEW).

Wildlife Survey Methods

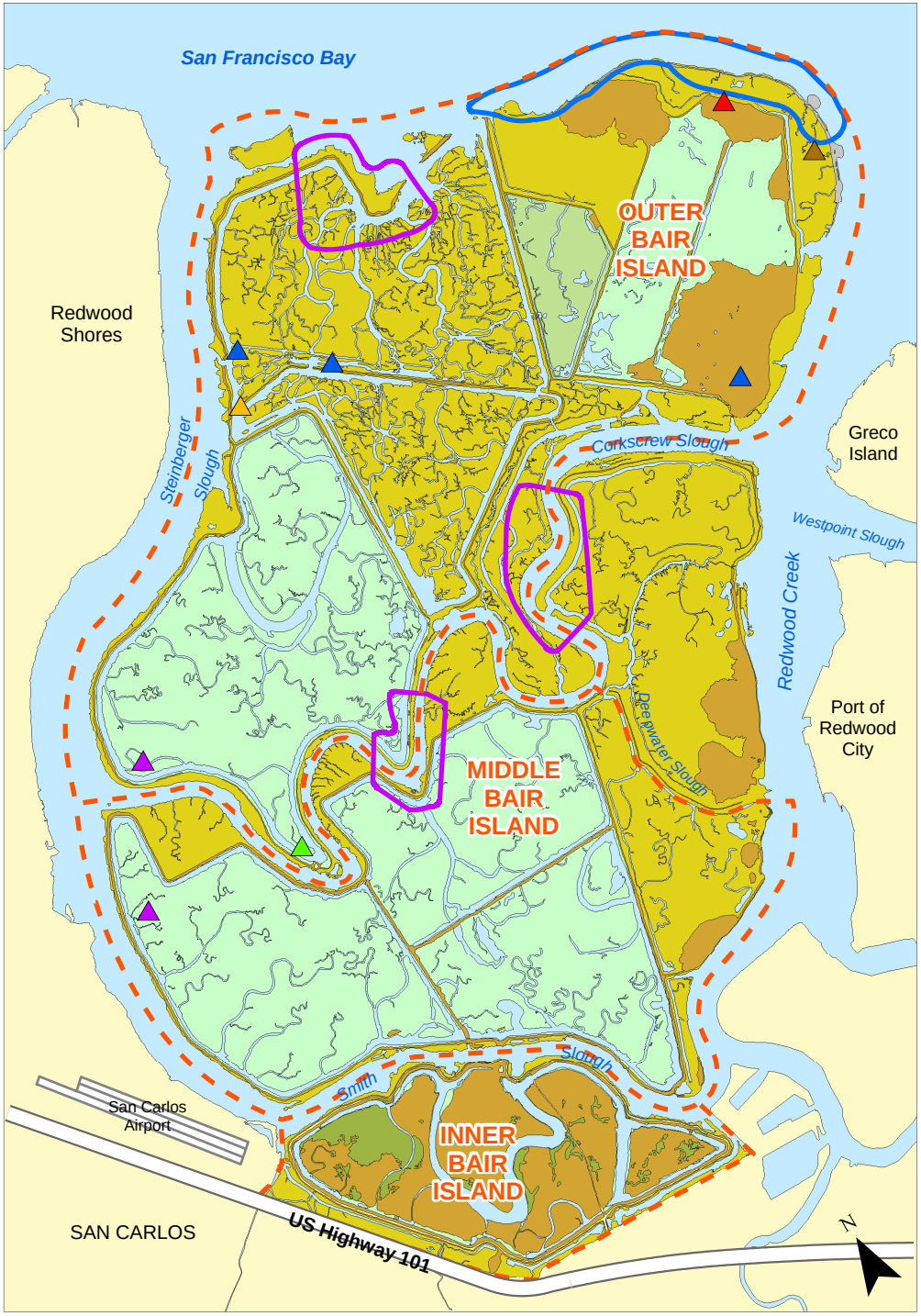
Reconnaissance level wildlife surveys were conducted during the same period as the habitat mapping. Observations were made from levees, PG&E walkways, as well as from the boat.

RESULTS

Habitat Types

During the mapping of Bair Island, seven (7) different habitat types were identified. These included tidal salt marsh, muted tidal salt marsh, diked salt marsh, seasonally ponded wetlands, aquatic/open water (including portions of subtidal and intertidal slough channels that adjoin the site), shell mounds, ruderal upland, and developed. Table 1 lists the quantity (in acres) of each habitat type that is present within the project boundaries of the Bair Island Restoration Project. Each of these habitats is briefly described below, and the locations of the habitats are demarcated on Figure 3.

FIGURE 3. HABITAT MAP



Project Boundaries

LOCATIONS OF WILDLIFE USE:

- Existing Brown Pelican Roost
- Existing Double-crested Cormorant/ Great Blue Heron Nests
- Existing White-tailed Kite Nest
- Potential Caspian Tern Colony
- Potential Forster's Tern/ American Avocet Colonies
- Previous Forster's Tern Colony
- Harbor Seal Haul-out Location
- Potential Snowy Plover Nesting Habitat

EXISTING HABITATS (2000):

- Aquatic
- Developed

INNER BAIR ISLAND: 8.47 acres MIDDLE BAIR ISLAND: 0.00 acres OUTER BAIR ISLAND: 0.00 acres

- Shell Mounds

INNER BAIR ISLAND: 0.00 acres MIDDLE BAIR ISLAND: 0.00 acres OUTER BAIR ISLAND: 5.63 acres

- Ruderal Upland

INNER BAIR ISLAND: 187.89 acres MIDDLE BAIR ISLAND: 38.02 acres OUTER BAIR ISLAND: 141.45 acres

- Diked Salt Marsh

INNER BAIR ISLAND: 9.06 acres MIDDLE BAIR ISLAND: 553.64 acres OUTER BAIR ISLAND: 468.90 acres

- Muted Salt Marsh

INNER BAIR ISLAND: 0.00 acres MIDDLE BAIR ISLAND: 0.00 acres OUTER BAIR ISLAND: 51.77 acres

- Seasonally Ponded Wetland

INNER BAIR ISLAND: 32.82 acres MIDDLE BAIR ISLAND: 0.00 acres OUTER BAIR ISLAND: 0.00 acres

- Tidal Salt Marsh

INNER BAIR ISLAND: 36.90 acres MIDDLE BAIR ISLAND: 192.54 acres OUTER BAIR ISLAND: 647.13 acres

Table 1. Habitat areas for Inner, Middle and Outer Bair Island.

LOCATION	HABITAT	ACRES
Inner Bair Island	Aquatic	48.71
	Developed	8.47
	Diked Salt Marsh	9.06
	Ruderal Upland	187.89
	Seasonally Ponded Wetland	32.82
	Tidal Salt Marsh	36.90
	Total	**323.83**
Middle Bair Island	Aquatic	112.01
	Diked Salt Marsh	553.64
	Ruderal Upland	38.02
	Tidal Salt Marsh	192.54
	Total	**896.21**
Outer Bair Island	Aquatic	100.21
	Diked Salt Marsh	468.90
	Muted Salt Marsh	51.77
	Ruderal Upland	141.45
	Shell Mounds	5.63
	Tidal Salt Marsh	647.13
	Total	**1415.09**
	Overall Acreage	**2635.13**

Tidal Salt Marsh. Tidal salt marsh occurs along the outboard side of the existing levees, as well as in the former salt ponds in the northwest section of Outer Bair where the levees have been allowed to breach. The tidal salt marsh within these former salt ponds is at a slightly lower elevation than the outboard marshes. This results in a plant community comprising an equal mix of cordgrass (*Spartina foliosa*) and pickleweed (*Salicornia virginica*). The slightly higher elevation outboard marshes are predominantly composed of pickleweed. The outboard marsh serves as the ideal target habitat for the restoration effort, with the marsh inside the former salt ponds on the west side of Outer Bair providing insight into the evolution of the sites once tidal action is returned.

Other common plant species found in the tidal salt marsh are alkali heath (*Frankenia salina*), saltmarsh dodder (*Cuscuta salina*) and jaumea (*Jaumea carnosa*). Marsh gumplant (*Grindelia stricta* var. *angustifolia*) occurs at higher elevations, as well as along the ecotone between tidal salt marsh and ruderal upland habitat

Muted Tidal Salt Marsh. One pond on eastern Outer Bair Island (Figure 3) contains deteriorated flapgate structures that are no longer functional and allow muted tidal action within the small leveed area. This area (formerly a Least Tern nesting colony) was leveed off in a failed attempt to protect Least Tern nesting habitat. Currently, the area consists of a mix of cordgrass and pickleweed.

Diked Salt Marsh. This habitat type is largely found on the interior of the former salt ponds on Inner, Middle and Outer Bair Island (Figure 3). These areas will be the primary targets for restoration to tidal salt marsh. The diked salt marsh habitat generally consists of pickleweed interspersed with mud flats and small open water areas. The quality of the habitat between the four former salt ponds is highly variable. The former salt pond on Outer Bair Island has the highest quality habitat with over 50% cover by pickleweed that has moderate vigor. The westernmost pond on Middle Bair has less than 50% cover by pickleweed of moderate to low vigor, while the two remaining diked salt marsh areas on Middle Bair have approximately 30% cover by pickleweed of low vigor (Figure 3). The latter two ponds also have a higher occurrence of brass buttons and bare soil/salt pan.

These ponds have subsided between 2.2 and 3.4 feet below the elevation of the tidal salt marsh on the outboard side of the levee (Philip Williams & Associates 2000), and the plants generally appear to have a reduced vigor. The sites' interiors are inaccessible in most places due to the borrow ditch that is located immediately inside of the existing levees. Other common plant species found within the diked salt marsh are cordgrass at lower elevations and alkali heath, brass buttons and saltgrass (*Distichlis spicata*) at the higher elevations.

Seasonally Ponded Wetlands. These wetlands are located in slightly lower topographic depressions within the levees of Inner Bair Island (Figure 3). The changes in microtopography responsible for small patches of seasonal wetlands are very numerous, and made precise field delineation of all the patches virtually impossible due to time and budgetary constraints. However, soil pits were dug within Inner Bair Island to determine the status of these seasonal wetland areas, and the results were extrapolated to all of Inner Bair using the habitat signatures present on the aerial photography. These wetland areas, supported largely by incident rainfall, were dominated by rabbitsfoot grass (*Polypogon monspeliensis*) and brass buttons (*Cotula coronopifolia*) with patches of pickleweed, spearscale (*Atriplex triangularis*) and alkali heath also occurring throughout.

Aquatic/Open Water. Aquatic habitat occurs within the low-flow channel of the creeks, slough channels and borrow ditches throughout the Bair Island complex. This deep-water habitat does not support either emergent or terrestrial vegetation.

Shell Mounds. A few small areas of exposed shell exist along the perimeter of Outer Bair Island along the San Francisco Bay (Figure 3). These areas are largely devoid of vegetation and are readily visible from the ground as well as from the aerial photography.

Ruderal Upland. Ruderal habitat is generally characterized by an area of land that receives some sort of natural or anthropogenic disturbance on a regular basis that significantly alters the natural landscape. Ruderal communities are assemblages of plants that thrive in disturbed areas; in the San Francisco Bay area weedy, annual, non-native plants are typically the first species to colonize these sites following a disturbance.

Ruderal Upland habitat is found in three primary locations on Bair Island. The first area is associated with the levee tops throughout all of Bair Island. Secondly, the majority of

Inner Bair is Ruderal Upland. This habitat is successional, as formerly larger areas of salt panes and less vegetation occurred in the area. Third, there are several other Ruderal Upland areas along the eastern side of Middle and Outer Bair upon spoil material disposal from past dredging of Redwood Creek. Other small, miscellaneous pockets of Ruderal Upland habitat exist throughout the project area, but are generally associated with either the levee system or with dredge spoil disposal (Figure 3).

The predominant ruderal species identified at Bair Island include Italian ryegrass (*Lolium multiflorum*), ripgut brome (*Bromus diandrus*), black mustard (*Brassica nigra*), wild radish (*Raphanus sativus*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), wild oats (*Avena fatua*), yellow star-thistle (*Centaurea solstitialis*), common sow thistle (*Sonchus oleraceus*), bull thistle (*Cirsium vulgare*), bristly ox-tongue (*Picris echioides*), rabbitsfoot grass, brass buttons, alkali heath, and coyote brush (*Baccharis pilularis*).

Developed. For the purpose of this analysis, developed habitat refers to the unvegetated trails that are present around the perimeter, and across the middle of, Inner Bair Island. The parking lot area adjacent to Whipple Avenue does contain some hardscape material, but the developed areas are mostly compacted soil. These areas do contain sporadic vegetation, generally consisting of ruderal vegetation around the perimeter trail (see Ruderal Upland description) and some brass buttons in the low spots along the trail down the middle of Inner Bair Island.

Dominant species in each habitat types (and jurisdictional designation) are summarized in Table 2.

Table 2. Dominant Species and Jurisdictional Designation, April 2000.

Habitat Type	Dominant Plant Species	Other Common Plant Species Present	USACE Jurisdiction
Tidal Salt Marsh	Pickleweed Cordgrass	Saltgrass Alkali Heath	Historic Section 10, Section 10, Section 404
Muted Tidal Salt Marsh	Pickleweed	Cordgrass	Historic Section 10, Section 404
Diked Salt Marsh	Pickleweed	Alkali Heath Saltgrass Brass Buttons	Historic Section 10, Section 404
Seasonally Ponded Wetlands	Rabbitsfoot Grass Brass Buttons	Pickleweed Alkali Heath	Historic Section 10, Section 404
Aquatic	N/A	N/A	Historic Section 10, Section 10, Section 404
Shell Mounds	N/A	N/A	Historic Section 10, Section 10, Section 404

Habitat Type	Dominant Plant Species	Other Common Plant Species Present	USACE Jurisdiction
Ruderal Upland	Italian Ryegrass Ripgut Brome Wild Radish	Rabbitsfoot Grass Brass Buttons Black Mustard	Historic Section 10
Developed	N/A	N/A	Historic Section 10

Wildlife

Fishes. Fish species that occur in the vicinity, include the bay ray (*Myliobatis californica*), leopard shark (*Triakis semifasciata*), northern anchovy (*Engralis mordax*), bay pipefish (*Syngnathus leptorhynchus*), bay goby (*Lepidogobius lepidus*), shiner surfperch (*Cymatogaster aggregata*), starry flounder (*Platichthys stellatus*), English sole (*Parophrys vetulus*), and striped bass (*Roccus saxatilis*). The steelhead (*Oncorhynchus mykiss*) and Chinook salmon (*Oncorhynchus tshawytscha*) likely also occur in the vicinity.

Reptiles. Reptile use in the study area is rather limited. Species found within the study area include the common garter snake (*Thamnophis sirtalis*), racer (*Coluber constrictor*), gopher snake (*Pituophis melanoleucus*), western fence lizard (*Sceloporus occidentalis*), and alligator lizard (*Gerrhonotus* spp.), all of which occur along the edge of well vegetated levees, particularly in the vicinity of upland areas (H. T. Harvey & Associates, unpubl. obs).

Mammals and Birds. Considerable information is available for bird occurrences in the study area (see below). However, of the mammals, only rodents have been systematically surveyed. Mammals species known to occur include the opossum (*Didelphis virginiana*), California vole (*Microtus californicus*), California ground squirrel (*Spermophilus beecheyi*), California jack rabbit (*Lepus californicus*), cottontail (*Sylvilagus audubonii*), brush rabbit (*S. bachmani*), pocket gopher (*Thomomys* spp.), the federally endangered salt marsh harvest mouse (*Reithrodontomys raviventris*), salt marsh wandering shrew (*Sorex vagrans halicoetes*), western harvest mouse (*R. megalotis*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), bats (probably *Myotis* spp. and *Tadarida braziliensis*), striped skunk (*Myphitis mephitis*), and red fox (*Vulpes vulpes*).

The federally endangered salt marsh harvest mouse inhabits areas dominated by pickleweed on Bair Island. It will be addressed in more detail below. Harbor seals, protected under the Marine Mammal Protection Act, haul out and breed in the area of Corkscrew Slough (Kopec and Harvey 1995). As many as 25 animals have been seen, but dedicated surveys have not been conducted. There could be interchange with the larger, more persistent numbers seen at Greco Island nearby.

Predominant bird species recorded during extensive surveys by biologists from the San Francisco Bay Bird Observatory (SFBBO) during summer and fall (Table 3) in order of numerical importance, are: Ring-billed (*Larus delewarensis)* and California Gulls (*Larus*

californicus), American Avocets (*Recurvirostra americanus)*, Black-necked Stilts (*Himantopus mexicanus)*, Least (*Calidris pusilla),* Western Sandpiper (*Calidris mauri),* Barn (*Hirundo rustica)* and Cliff Swallow (*Hirundo pyrrhonota),* and Short-billed (*Limnodromus griseus*) and Long-billed Dowitchers (*Limnodromus scolopaceus*). During fall the predominant species have been Least and Western Sandpipers, Ring-billed Gulls, Dowitcher, and American Coots (*Fulica Americana).* Foraging ducks, shorebirds, herons and egrets are also found.

Table 3. Summary of Results of Bird Surveys Conducted in The South Bay.[a]
The avifauna of Bair Island is similar to this in terms of relative abundance of species. Counts of "0" indicate that the species occurs, but in number too low to have been detected on the surveys. Species seen on brief surveys by H.T. Harvey biologists on two days in April 2000 are shown in bold.

	SUMMER	FALL
Clark's/Western Grebe	0	0.1 (1)
American White Pelican	0.2 (4)	0
California Brown Pelican	0.1 (5)	0
Double-crested Cormorant[b]	0.2 (5)	0
Great Blue Heron	0.2 (4)	0
American Egret[b]	<0.1 (2)	0.1 (1)
Snowy Egret[b]	0.7 (5)	0.4 (2)
Black-crowned Night Heron	<0.1 (1)	0
Mallard[b]	3.4 (20)	0.5 (7)
Northern Pintail[b]	<0.1 (2)	0
Gadwall[b]	1.9 (56)	0
Northern Shoveller[b]	<0.1 (1)	2.1 (37)
Cinnamon Teal[b]	0.1 (4)	0
Green-winged Teal	<0.1 (1)	0
Lesser Scaup[b]	0.1 (5)	0
duck spp.	3.9 (80)	0
California Clapper Rail[b]	0	0
Virginia Rail	0	2.5 (7)
Sora	0.4 (6)	0.3 (2)
American Coot[b]	1.2 (7)	18.6 (35)
Common Moorhen[b]	0.8 (6)	1.1 (2)
American Avocet[b]	19.4 (272)	3.1 (15)
Black-necked Stilt[b]	20.4 (327)	2.0 (10)
Killdeer[b]	1.4 (8)	4.4 (15)
Black-bellied Plover	<0.1 (1)	1.1 (6)
Snowy Plover	0	0
Semipalmated Plover	0.1 (2)	0
Long-billed Curlew	1.0 (15)	0.2 (2)

	SUMMER	FALL
Whimbrel	<0.1 (1)	<0.1 (1)
Marbled Godwit	3.4 (43)	1.5 (11)
Long-billed Dowitcher	1.9 (18)	0.1 (1)
Short-billed Dowitcher	2.7 (15)	0
dowitcher spp.	9.3 (103)	16.1 (80)
Willet	0.8 (9)	0.8 (4)
Greater Yellowlegs	0.4 (7)	0.2 (1)
Lesser Yellowlegs	0.1 (3)	0
yellowlegs spp.	0.2 (3)	0
Dunlin	0.7 (30)	0
Western Sandpiper	6.1 (50)	8.4 (35)
Least Sandpiper	6.6 (52)	17.8 (61)
Western/Least sandpipers	16.2 (80)	91.2 (250)
Wilson's Phalarope	1.6 (13)	0
Red-necked Phalarope	8.6 (380)	0
phalarope spp.	13.2 (580)	0
Herring Gull	0	0.3 (2)
Western Gull	3.9 (73)	2.2 (5)
California Gull	9.0 (78)	4.5 (17)
Ring-billed Gull	14.9 (45)	48.4 (150)
Mew Gull	0	0.1 (1)
gull spp	37.3 (1000)	0.3 (5)
Caspian Tern	<0.1 (1)	0
Forster's Tern[b]	0.3 (8)	0
Turkey Vulture	<0.1 (2)	0
Red-tailed Hawk	0	0.3 (2)
Northern Harrier[b]	0.1 (1)	0.2 (2)
White-tailed Kite[b]	<0.1 (1)	<0.1 (1)
Ring-necked Pheasant	<0.1 (1)	0
Black Phoebe[b]	0.2 (1)	<0.1 (1)
Barn Swallow[b]	10.9 (32)	0
Cliff Swallow[b]	8.1 (100)	0
Violet-green Swallow	0.2 (9)	0
Loggerhead Shrike[b]	<0.1 (2)	0
Mourning Dove[b]	0.3 (2)	0
Marsh Wren[b]	2.9 (26)	1.1 (3)
Brewer's Blackbird[b]	0.1 (1)	0.4 (5)
Song Sparrow[b]	1.3 (6)	1.5 (3)
Savannah Sparrow[b]	0	0.5 (3)

	SUMMER	FALL
Salt Marsh Yellowthroat[b]	0	0.7 (4)
House Finch[b]	0.7 (7)	0

[a] – San Francisco Bay Bird Observatory (SFBBO 1991, 1999). Surveys during summer were from 4 June to 20 September 1989-90; surveys during fall were from 24 September to 26 November 1989-90. In taxonomic order, the average number of birds is given (average counts for each year were added together and divided by two) followed by maximum count (in parentheses; maximum counts are the maximum for the two years).

[b] – Likely or definitely breeds on Bair Island.

The federally endangered California Clapper Rail likely has a healthy, resident population in the tidal salt marshes of Outer Bair Island. Alameda Song Sparrow (*Melospiza melodia maxillaris*), Marsh Wrens (*Cistothorus palustris*), some ducks, primarily the Mallard (*Anas platyrhynchos*) and Gadwall (*Anas strepera*), and Canada Geese (*Branta canadensis*) nest on levees and among higher vegetation throughout the salt marsh. Double-crested Cormorant (*Phalacrocorax auritus)* (up to 100 pair) and Great Blue Herons (*Ardea herodias*) (about 10 pair) nest on PG&E towers located at the northern and southern shores of Outer Bair Island (Figure 3). Black-crowned Night Herons (*Nycticorax nycticorax)*, Great Egrets (*Ardea alba*) and Snowy Egrets (*Egretta thula*) formerly nested on Bair Island, but no longer actively nest on site (Ryan and Parkin 1998). The latter three species, in the process of nesting, eventually destroyed the shrubs and small trees in which they made nests, and since have moved to shrubs nearby at Redwood Shores. The colony at Redwood Shores appeared and grew as the Bair Island colony shrank and disappeared. White-tailed Kites (*Elanus leucurus*) and Northern Harriers (*Circus cyaneus*) nest along the levees of Bair Island. Formerly, the federally endangered Least Tern (*Sterna antillarum*) and the state protected Caspian Tern (*Sterna caspia*) nested on Bair Island, but no longer. These two tern species disappeared when Outer Bair Island was restored to salt marsh. The same scenario likely is true of the threatened Western Snowy Plover (but see below). Currently, a small colony of Forster's Terns (*Sterna forsteri)* occurs in the western portion of Middle Bair Island. The colony moves about year to year. Other nesting species include Black-necked Stilt and American Avocet.

Special-Status Plant Species

When assessing the site's potential habitat suitability for special-status plant species, several factors are generally taken under consideration, including: 1) the proximity and date of known occurrences, 2) the presence and ecological condition of habitats on-site, 3) past and current land use practices, 4) the existence of known associate species, and 4) direct observation of plants as a result of optimally-timed, species-specific surveys. Reconnaissance-level surveys for special status plant species were conducted during habitat mapping surveys between 14 and 28 April 2000 within the project area. Additional species-specific surveys will be necessary to account for potentially occurring plants with later blooming periods.

The special-status plant species that occur regionally in habitats similar to those found in the project area are described below. The process of identifying special-status plant

species for consideration involved two steps. First, a query of special-status plants in the California Natural Diversity Database (CNDDB) Redwood Point quadrangle, and eight adjoining quads. Second, the California Native Plant Society Inventory (1994) was used to produce a similar list for San Mateo County. The habitat requirements and current distribution for each special-status species were the principal criteria used for inclusion in the list of potentially occurring species on site. Therefore, plants were considered on the basis of their occurrence in the broad categories of marshes and swamps, and valley and foothill grasslands that are most similar to the salt marsh, seasonal wetland, and ruderal habitats on site.

Many of the special-status plant species that occur in San Mateo County are found in habitat types that are not present on site. These habitat types include: dune and prairie habitats, coniferous habitats, woodland habitats, meadow and vernal pool habitats, and scrubs and chaparral habitats, and serpentine environments. In addition, the following sensitive habitats identified by the CDFG Rarefind Database query are not present on site: valley oak woodland, valley needlegrass grassland, and serpentine bunchgrass. A fourth sensitive habitat, northern coastal salt marsh, is prevalent on site.

A total of 41 special-status taxa occur in the area within similar habitats according to the CNPS inventory and the CDFG Rarefind Database. Of these, 37 species were dismissed due to the absence of suitable microhabitats (mostly serpentine substrates), and/or have been regarded as either extirpated from San Mateo County; their distribution has been reduced to historical occurrences, or are considered extinct. Suitable habitat exists in the project area for only 4 species including: Contra Costa Goldfields (*Lasthenia conjugens*), Point Reyes bird's beak (*Cordylanthus maritimus* ssp. *palustris*), Congdon's tarplant (*Hemizonia parryi* ssp. *condonii*), and marsh gumplant (*Grindelia stricta* var. *angustifolia*). Of these, the marsh gumplant was observed on site. Congdon's tarplant and the Point Reyes bird's beak have not been observed, and detailed surveys for these species have not been conducted.

Federal or State Endangered or Threatened Species

Contra Costa Goldfields (*Lasthenia conjugens*). Federal Listing Status: Endangered; State Listing Status: None; CNPS List 1B. This annual herb occurs in mesic valley and foothill grasslands, and vernal pools. The blooming period is from March to June. This range of this species is reported to have been reduced to Napa and Solano counties, having been extirpated from five other counties forming its historic range, including Santa Clara County. The DFG rarefind database has only historical reports of this species within the quadrangle search area. However suitable habitat is present on site and known populations occur across the bay in Alameda County.

State Protected or CNPS Species

Point Reyes Bird's-Beak (*Cordylanthus maritimus ssp. palustris*). Federal listing status: Species of Concern; State listing status: None; CNPS List 1B. This annul hemi-parasitic herb occurs in coastal salt marsh. The blooming period extends from June

to October. The range of this species includes San Mateo and 5 other counties in California, and in Oregon, though it is believed to be extirpated from the south bay area. The DFG rarefind database has only historical reports of this species within the Redwood Point quadrangle. However suitable habitat is present on site.

Congdon's Tarplant (*Hemizonia parryi* ssp. *congdonii*). Federal Listing Status: Species of Concern; State Listing Status: None; CNPS List: 1B. This annual herb occurs in valley and foothill grassland, particularly those with alkaline substrates, and in sumps or disturbed areas where water collects. The blooming period extends from June through November. The range of this species has been reduced to Monterey, San Luis Obispo, Santa Clara, and Alameda counties. The DFG rarefind database has only historical reports of this species within the quadrangle search area as close as Mountain View. However suitable habitat is present on site and known populations occur in Alviso.

Marsh Gumplant (*Grindelia stricta* var. *angustifolia*). Federal listing status: None; State listing status: None; CNPS List 4. This perennial herb occurs in coastal salt marsh and tidally influenced areas between sea level and 10 meters. The blooming period extends from August to October. The range of this species includes San Mateo and 9 other counties in California. The DFG rarefind database has no reports of this species within the quadrangle search area, however, suitable habitat is present on site and the species was observed within the tidal salt marsh habitats.

Listed Wildlife Species

Two species listed as Federally Endangered (FE) breed in high density on Outer Bair Island: the California Clapper Rail and salt marsh harvest mouse. The latter likely occurs on Middle Bair Island also, as there is much pickleweed present. Three listed species occur as seasonal residents, including the Western Snowy Plover (Federally Threatened, FT), California Least Tern (FE) and California Brown Pelican (*Pelecanus occidentalis*) FE); and two others, the steelhead (FT) and Chinook salmon (FT), migrate through the area. The California Black Rail (State Threatened and Federal candidate) and Bank Swallow (State Threatened) could occur rarely in the study area. The harbor seal, protected under the Marine Mammal Protection Act, hauls out and pups along the banks of Corkscrew Slough. The Alameda Song Sparrow and Salt Marsh Common Yellowthroat have been candidate species for federal and state listing, and are considered species of special concern by the State of California. The Alameda Song Sparrow is common in the salt marsh of Bair Island; the Salt Marsh Common Yellowthroat is likely sparse owing to a lack of willow thickets and *Scirpus* sp.

California Clapper Rail. The California Clapper Rail breeds in salt and brackish marshes along the edge of San Francisco Bay, and is most abundant in extensive salt marshes dominated by cordgrass, pickleweed, and marsh gumplant associated with numerous secondary tidal channels (Harvey 1980). Within these salt marshes, nests are placed in or under this vegetation as well as saltgrass, or tidal wrack (DeGroot 1927, Evens and Page 1983, Harvey 1980, Foerster et al. 1990). Most foraging occurs on exposed mud along tidal (usually secondary) channels or in vegetation at the edges of

such channels (Shuford 1993). In winter, California Clapper Rails tend to forage primarily in cordgrass-dominated habitat (P. R. Kelly, pers. comm. in Shuford 1993), although tall vegetation at the edges of the upper marsh provides important cover during high winter tides.

Although California Clapper Rails also breed in brackish marshes, especially those dominated by alkali bulrush (*Scirpus robustus*), the importance of these marshes to California Clapper Rails is not well understood (H. T. Harvey & Associates 1989, 1990b, 1991a,b, Collins et al. 1994). No recent breeding-season surveys have been conducted for this species at Bair Island. However, the species was reported there by Gill (1979); other surveys have found them in marshes immediately adjacent to Bair Island (e.g., Harvey 1980). Gill (1979: 43) wrote that, "the Clapper Rail can be expected to inhabit those areas of Bair Island now being restored to tidal marsh." At that time, he was referring to the restoration of Outer Bair Island.

Salt Marsh Harvest Mouse. The salt marsh harvest mouse inhabits pickleweed marshes of the San Francisco Bay. This species is most abundant in deep, dense pickleweed in marshes providing non-submerged refugia during high winter tides (Shellhammer et al. 1982). Although this species makes some use of grasses and salt-tolerant forbs at the upper margins of salt and brackish marshes, it is closely tied to the cover of dense pickleweed, and it makes little use of pure alkali bulrush or cordgrass stands (Wondolleck et al. 1976, Shellhammer 1977). These mice inhabit both marshes that are open to tidal action and diked marshes, provided that suitable pickleweed habitat is present.

Although no recent surveys have been conducted, the areas of Bair Island dominated by pickleweed provide high quality habitat for this species. This is especially true of the tidal marshes of the entire study area, and the muted tidal and diked marshes of Outer Bair. The diked units of Middle Bair contain less pickleweed and are patchier, less dense and less deep. The pickleweed habitats in Middle Bair provide salt marsh harvest mouse habitat that ranges from slightly better than average to non-habitat. The large cell that makes up Inner Bair is mostly non-habitat for the mouse, as pickleweed is found only as strips along waterways and standing water. The overall habitat value of Inner Bair to the mouse is generally poor. Most of the levees between cells in Middle Bair have moderate cover hence it seems likely that salt marsh harvest mice may be able to move between cells, at least sporadically.

Other Listed Species. Other listed species that are found in the vicinity of Bair Island, but which do not breed there, include the Western Snowy Plover (FT), California Least Tern (FE), California Brown Pelican (FE), steelhead (FT), and Chinook salmon (FT).

Snowy Plovers were reported from Bair Island during the breeding season in the 1960s and early 1970s (though no nests were found); they have not been detected since (Page and Stenzel 1981). They do nest in the South Bay, and individuals likely forage at times on the mud flats of Bair Island (see Page and Stenzel 1981). Suitable Snowy Plover nesting habitat does occur now, if freed of human disturbance, on the outer barrier beaches of Outer Bair Island (Figure 1).

Least Terns (and Caspian Terns) once nested in an area on Outer Bair Island, but not since 1984 (former nesting area is now tidal salt marsh; e.g. Naslund et al. 1982, Layne and Harding-Smith 1995). The main post-breeding (fall) staging area of the Least Tern in the South Bay is in the complex of salt ponds immediately north of Moffett Field and, to a lesser extent, in the vicinity of Shoreline Park in Mountain View. Least Terns no doubt forage over the sloughs in the vicinity of Bair Island. Caspian Terns (about 25) were observed courting at a roost site on the outer edge of Bair Island on 26 April 2000 (H.T. Harvey and Associates, unpublished observations). They would likely nest in that vicinity, although the area may receive too much anthropogenic disturbance (kayakers, etc.).

The California Brown Pelican is a regular non-breeding forager in the area. A roost site occurs on the barrier beach along the outer, eastern shore of Bair Island (Figure 3). Species such as the California Black Rail (state threatened and federal candidate) and Bank Swallow (state threatened) may occur rarely, but do not nest in the area.

The Caspian and Forster's terns both are considered by the State as being species of concern owing to restricted habitat. In particular, their colonies are given protected status. The Forster's Tern nests on Middle Bair, and the Caspian Tern once nested, and may nest again, on Outer Bair; see below.

Adult steelhead and Chinook salmon migrate up various creeks and rivers in the South Bay, and foraging smolts of both species after swimming down river frequent areas throughout San Francisco Bay. Likely these fish frequent Redwood Slough and other deep sloughs of Bair Island.

A variety of other special status wildlife species are known from the vicinity and would be expected on-site.

WETLAND TECHNICAL ASSESSMENT

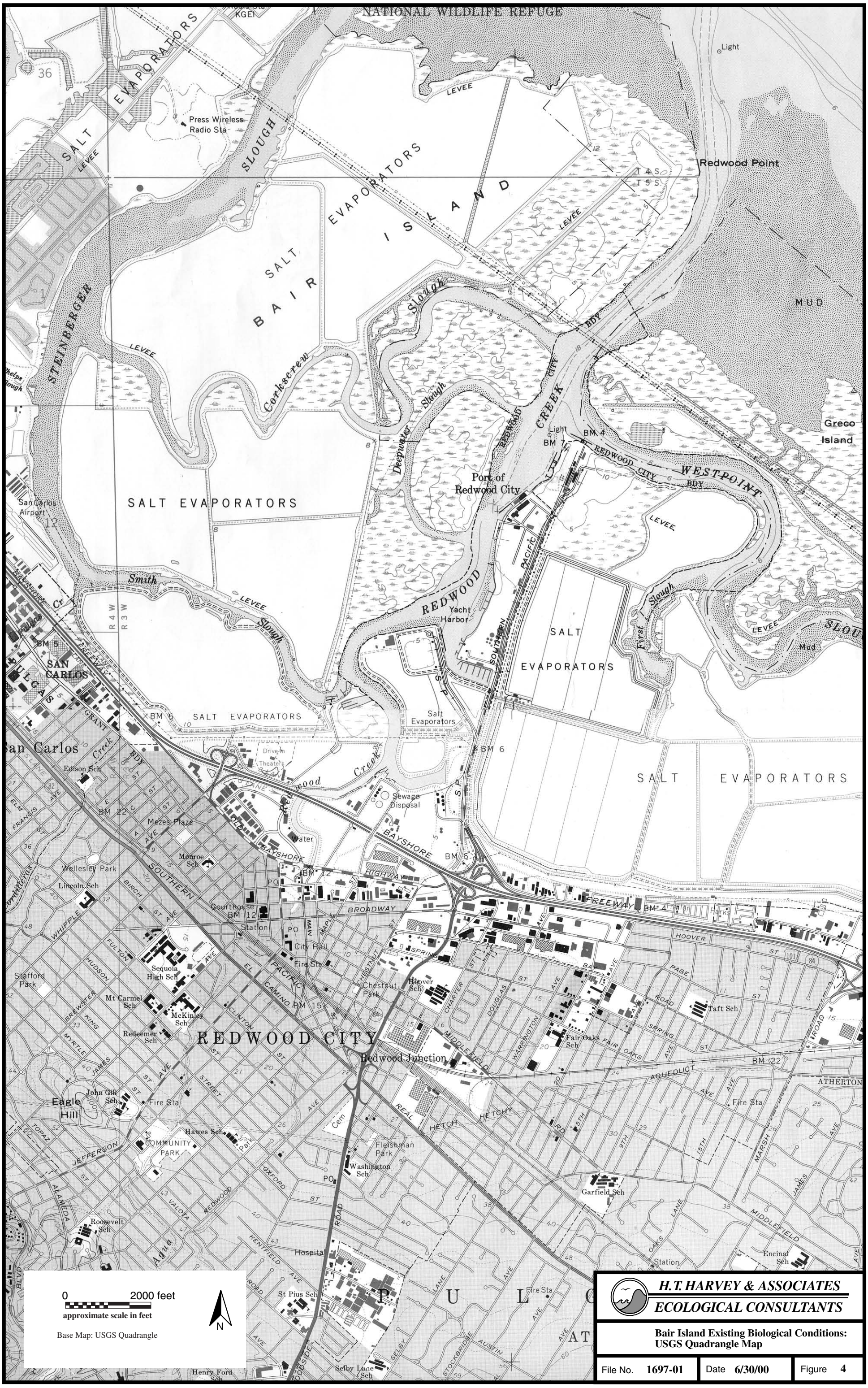
The Bair Island tidal wetland restoration project site occurs within the city limits of Redwood City, San Mateo County, California (Figure 1). The site is situated adjacent to San Francisco Bay just north of the Ravenswood Open Space Preserve. It is located on the Palo Alto and Redwood Point U.S.G.S. Quadrangle Maps (Figure 4).

Bair Island is largely surrounded by water, with the exception of Inner Bair, which is accessible to pedestrians from Whipple Avenue. Bair Island is bordered to the west by Steinberger Slough, to the north by San Francisco Bay, to the east by Redwood Creek, and to the south by Highway 101 (Figure 1). Inner Bair is separated from Middle Bair by Smith Slough and Middle Bair is separated from Outer Bair by Corkscrew Slough (Figure 1). The project site is characterized by tidal, muted and diked salt marsh, mud flats and salt pannes, levees and borrow ditches, as well as historic slough channels.

The project site is underlain predominantly by Reyes clay 0-1% slopes, with some areas of Novato clay, 0-1% slopes (Figure 5). The Reyes clay series are deep, somewhat poorly drained series on reclaimed tidal lands that were at one time used as evaporation or salt producing ponds (Soil Conservation Service; SCS 1991). The Novato clay is characterized by very deep, very poorly-drained soils that formed in alluvium derived from various types of rock (Soil Conservation Service; SCS 1991). The Soil Conservation Service (1992) classifies both the Reyes and Novato series as hydric soils. Average annual precipitation within the project vicinity is 15 inches and occurs primarily during November through April. The average annual temperature as reported for Redwood City is approximately 59.1^{o}F (SCS 1991). The 30-year normal annual temperature as reported from the National Weather Service is 59.3^{o}F for Redwood City (1961-1990). Topography of the site is relatively varied; elevation ranges from approximately –0.8 feet National Geodetic Vertical Datum (NGVD) in the subsided, diked marsh plane, to 9 feet NGVD at the levee crests, to over 11 feet NGVD at some of the spoil deposits (PWA 2000, LSA 1999).

The U. S. Fish and Wildlife Service has described Bair Island using seven different habitat classifications (Figure 6). These habitats include estuarine, intertidal, emergent, regularly flooded (E2EMN), estuarine, intertidal, unconsolidated shore, regularly flooded (E2USN), palustrine, emergent, seasonally flooded, mixohaline, diked/impounded (PEMC3h), palustrine, unconsolidated bottom, permanently flooded, diked/impounded (PUBHh), palustrine, unconsolidated bottom, semi-permanently flooded, diked/impounded (PUBFh), lacustrine, littoral, unconsolidated shore, seasonally flooded, mixohaline, diked/impounded (L2USC3h), and lacustrine, littoral, unconsolidated shore, seasonally flooded, hyperhaline, diked/impounded (L2USC1h).

The project site includes extensive areas that are regulated by Section 10 of the Rivers and Harbors Act of 1899; these include historical and current Section 10 Waters.



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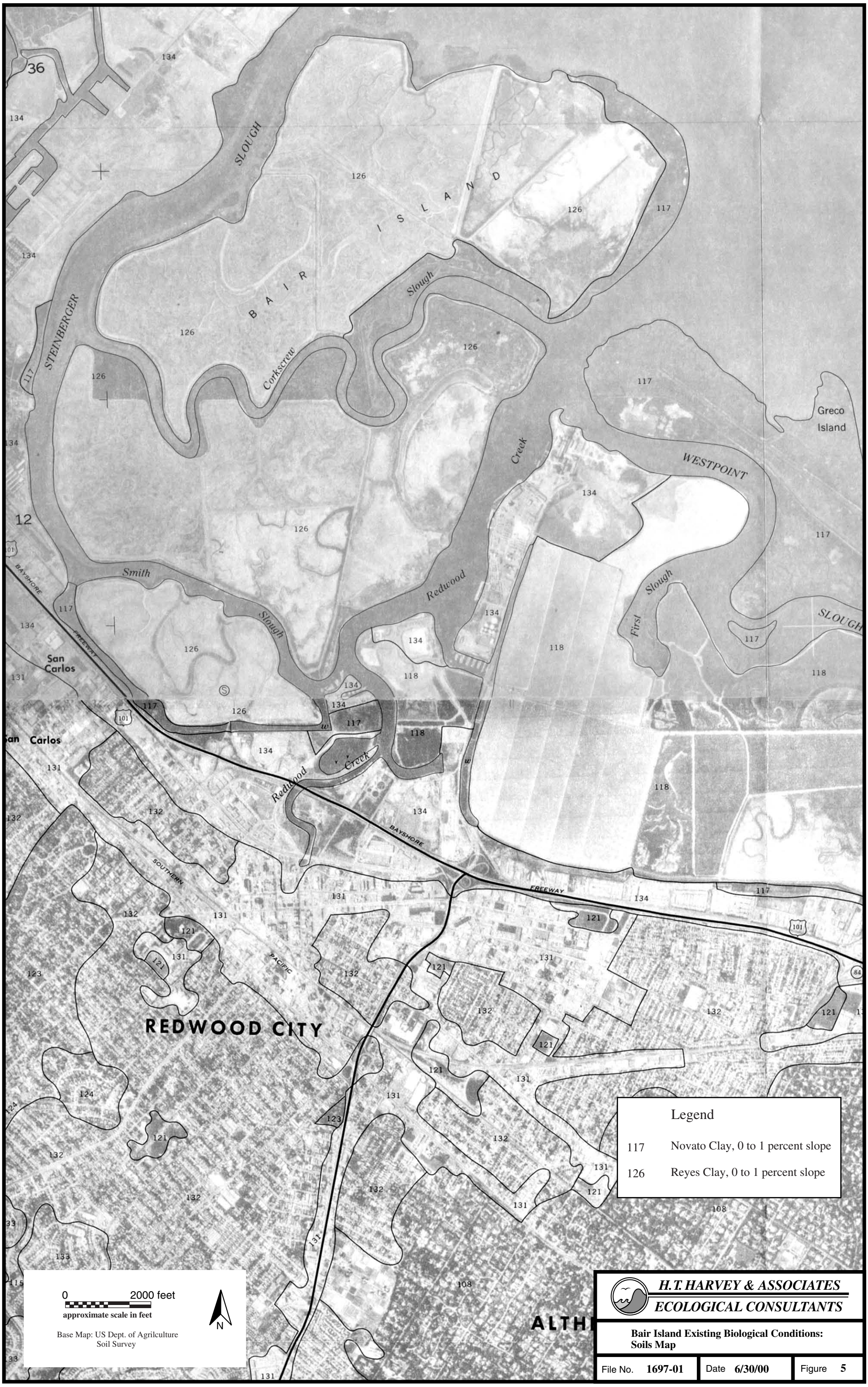
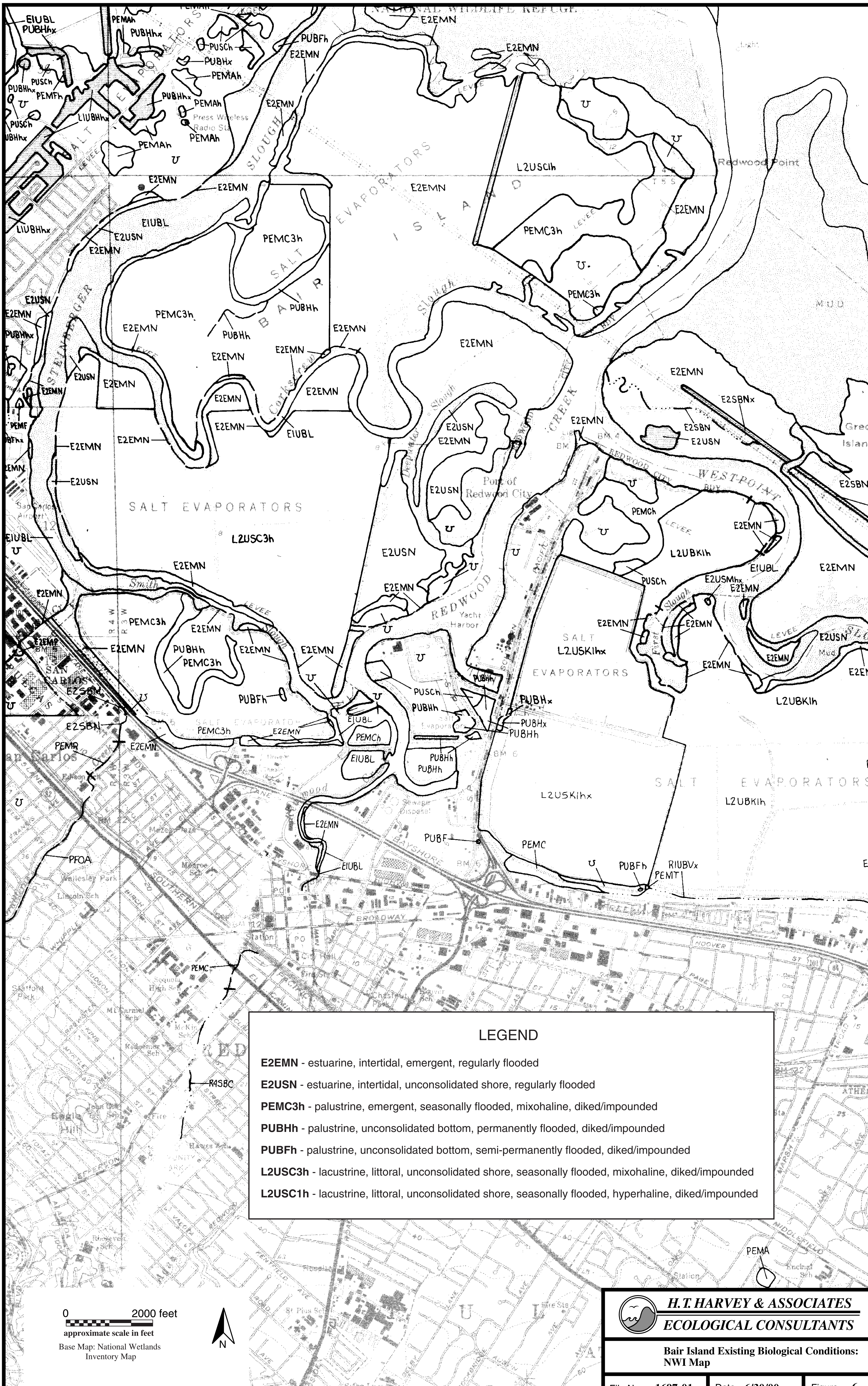
ECOLOGICAL CONSULTANTS

Bair Island Existing Biological Conditions: USGS Quadrangle Map

File No. 1697-01	Date 6/30/00	Figure 4


36
12
SLOUGH
STEINBERGER
BAIR
ISLAND
Slough
Corkscrew
Creek
WESTPOINT
Greco
Island
Smith
Slough
Redwood
First
Slough
SLOUGH
San
Carlos
Redwood
Creek
BAYSHORE
FREEWAY
SOUTHERN
PACIFIC
REDWOOD CITY
ALTH
0
2000 feet
approximate scale in feet
N
Base Map: US Dept. of Agrilculture
Soil Survey
Legend
117 Novato Clay, 0 to 1 percent slope
126 Reyes Clay, 0 to 1 percent slope
H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS
Bair Island Existing Biological Conditions:
Soils Map
File No. 1697-01
Date 6/30/00
Figure 5



LEGEND

E2EMN - estuarine, intertidal, emergent, regularly flooded

E2USN - estuarine, intertidal, unconsolidated shore, regularly flooded

PEMC3h - palustrine, emergent, seasonally flooded, mixohaline, diked/impounded

PUBHh - palustrine, unconsolidated bottom, permanently flooded, diked/impounded

PUBFh - palustrine, unconsolidated bottom, semi-permanently flooded, diked/impounded

L2USC3h - lacustrine, littoral, unconsolidated shore, seasonally flooded, mixohaline, diked/impounded

L2USC1h - lacustrine, littoral, unconsolidated shore, seasonally flooded, hyperhaline, diked/impounded

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Bair Island Existing Biological Conditions: NWI Map

File No. **1697-01**	Date **6/30/00**	Figure **6**

SURVEY PURPOSE

H. T. Harvey & Associates' biologists surveyed all portions of the project site for areas that potentially meet the regulatory definition of Waters of the United States (jurisdictional waters). Development in areas identified as such is subject to the permit requirements of the U. S Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (1972) and Section 10 of the Rivers and Harbors Act (1899). The primary purpose of our work was to provide a technical assessment of potential jurisdictional waters located within the study area under conditions existing at the time of the survey.

SURVEY METHODS

Habitat mapping of the entire study area was conducted during six (6) visits to Bair Island from April 14 to April 27, 2000. In order to formalize the extent and location of jurisdictional waters, including wetlands within the project area, a routine determination was conducted at eight points thought to be representative of the habitats as established by the mapping effort. A description of these sites was conducted using methodologies approved by the USACE. Personnel included John Bourgeois (wetland restoration ecologist).

Generally, surveys conducted on non-disturbed sites examine the vegetation, soils, and hydrology using the "Routine Determination Method, On-Site Inspection Necessary: (Section D) outlined in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). This multi-parameter approach to identifying wetlands is based upon the presence of hydrophytic vegetation, hydric soils and wetland hydrology. Although the site has been substantially modified over the years (i.e. diked, drained, etc.) in terms of topography, hydrologic conditions and vegetative cover, these conditions represent the new normal circumstance.

Alternatively, upland sites (non-wetlands) which subsequently developed some characteristics of wetlands, due to intentional or incidental human activities, are examined for wetlands using the techniques described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) for "Atypical Situations: Man-Induced Wetlands" (Section F, Subsection 4). The majority of such wetlands involve a significant change in the hydrologic regime, which may either increase or decrease the wetness of an area.

Prior to site surveys, topographic maps and aerial photographs of the study area were obtained form several sources and were reviewed. These sources included the U. S. Geological Survey Map for the Redwood Point and Palo Alto Quadrangles (1991), National Wetlands Inventory Maps for the Redwood Point and Palo Alto Quadrangles (1985), and aerial photographs contained in the *Soil Survey of San Mateo County, Eastern Part, and San Francisco County, California* (SCS 1991).

The boundaries of potential jurisdictional waters located on site were drawn directly as lines and polygons onto an acetate overlay on top of 1-inch : 200-feet black and white aerial photography. Jurisdictional acreages and color-coded figures for the entire Study Area were generated by GIS systems Microstation and ARCVIEW as previously discussed in the habitats section.

A brief overview of the USACE regulations specifically applicable to the identification of jurisdictional waters on the Bair Island Restoration project and general guidance regarding the acquisition of permits for proposed activities within these jurisdictional waters are summarized below.

WATERS OF THE U. S. REGULATIONS OVERVIEW

Areas meeting the regulatory definition of "Waters of the United States" are subject to the regulatory jurisdiction of the U. S. Army Corps of Engineers (USACE). The USACE under provisions of Section 404 of the Clean Water Act (1972) has jurisdiction over "Waters of the United States" (jurisdictional waters). These waters may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mud flats, sandflats, playa lakes, natural ponds, etc.), all impoundments of waters otherwise defined as "Waters of the U. S.," tributaries of waters otherwise defined as "Waters of the U. S.," the territorial seas, and wetlands adjacent to "Waters of the U.S." (33 CFR, Part 328, Section 328.3).

Areas not considered to be jurisdictional waters include non-tidal drainage and irrigation ditches excavated on dry land, artificially-irrigated areas, artificial lakes or ponds used for irrigation or stock watering, small artificial water bodies such as swimming pools, and water-filled depressions (33 CFR, Part 328).

WETLAND TECHNICAL ASSESSMENT

Below we provide a detailed description of the methodology used in the identification of the different classes of jurisdictional waters, having the potential of occurring on site, including: A) Section 404 jurisdictional wetlands; B) Section 404 tributary waters; C) Section 404 "other waters"; D) Section 404 Mud flats, and; E) Historical and Current Section 10 Waters.

A) Identification of Section 404 Jurisdictional Wetlands (Special Aquatic Sites)

Surveys were conducted within the study area for areas that meet the technical criteria of jurisdictional wetlands. The vegetation, soils, and hydrology of the site were examined following the guidelines outlined in the "Routine Determination Method" in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987).

The property was examined for topographic features, drainages, alterations to site hydrology and areas of significant recent disturbance by hiking the entire site. A

determination was then made as to whether normal environmental conditions were present at the time of the field surveys. Data were used to document which portions of the site were wetlands. Information obtained in the field was drawn onto a 1-inch : 200-feet black line copy of an aerial photograph of the project site.

Vegetation. Plants observed at each of the sample sites were identified to species using *The Jepson Manual* (Hickman 1993). Additional references included *A California Flora and Supplement* (Munz and Keck 1973), *A Flora of the Marshes of California* (Mason 1969), *Manual of the Grasses of the United States* (Hitchcock 1971), and *Weeds of California* (Robbins, et al. 1970). The wetland indicator status of each species was obtained from the 1987 Wetland Plant List, California (Reed 1988). A list of dominant species for each observation area was made and it was then determined which of the observation areas supported wetland vegetation (Appendix B).

Wetland indicator species are so designated according to their frequency of occurrence in wetlands. For instance, a species with a presumed frequency of occurrence of 67% to 99% in wetlands is designated a facultative wetland indicator species. The wetland indicator groups, indicator symbol and the frequency of occurrence of species within them in wetlands are as follows:

Table 4. Wetland Indicator Status Categories for Vascular Plants.

INDICATOR CATEGORY	SYMBOL	FREQUENCY OF OCCURRENCE
OBLIGATE	OBL	greater than 99%
FACULTATIVE WETLAND	FACW	67 - 99%
FACULTATIVE	FAC	34 - 66%
FACULTATIVE UPLAND	FACU	1 - 33%
UPLAND	UPL	less than 1%

Based upon information contained in *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987).

Obligate and facultative wetland indicator species are hydrophytes that occur "in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present" (Environmental Laboratory 1987). Facultative indicator species may be considered wetland indicator species when found growing in hydric soils that experience periodic saturation.

Soils. Where possible, the top 18 inches of the soil profile was examined for hydric characteristics. Such characteristics include the presence of organic soils (histosols), histic epipedons, aquic or peraquic moisture regime, presence of soil on hydric soil list, mottling indicated by the presence of gleyed or bright spots of colors (in the former case, blue grays; in the latter case, orange red, or red brown) within the soil horizons observed. Mottling of soils usually indicates poor aeration and lack of good drainage. Munsell Soil Notations (Munsell Soil Color Charts, Kollmorgen Instr. Corp. 1990) were recorded for the soil matrix for each soil sample. The last digit of the Munsell Soil Notation refers to the chroma of the sample. This notation consists of numbers beginning with 0 for neutral

grays and increasing at equal intervals to a maximum of about 20. Chroma values of the soil matrix which are one (1) or less, or of two (2) or less when mottling is present, are typical of soils which have developed under anaerobic conditions. In addition, the Field Indicators of Hydric Soils in the United States, Version 4 (USDA, NRCS 1998) was used in the identification of hydric soil features.

In sandy soils, such as alluvial deposits in the bottom of drainage channels, hydric soil indicators include high organic matter content in the surface horizon and streaking of subsurface horizons by organic matter. All soil colors indicated in this report were taken under clear, sunny skies using moistened soil samples.

The *Soil Survey of San Mateo County, Eastern Part, and San Francisco County, California* (SCS 1991) was consulted in order to determine which soil types have been mapped on the project site. Descriptions of soil mapping units and the list of hydric soils in San Mateo County are included in Appendix A.

Hydrology. Each of the sample sites was examined for positive field indicators of wetland hydrology. Such indicators might include visual observation of inundation and/or soil saturation, watermarks on culverts, drift lines, water-borne sediment deposits, water-stained leaves, and drainage patterns within wetlands.

B) Identification of Section 404 "Other Waters"

"Other waters" include lakes, seasonal ponds and seasonal springs. Such areas are identified by the presence of standing or running water and generally lack hydrophytic vegetation. The project site was surveyed for areas meeting the regulatory definition of "other waters."

C) Identification Of Section 404: Mud Flats

Mud flats are special-aquatic sites that are not vegetated. The project site was surveyed for areas meeting the regulatory definition of mud flats.

D) Identification Of Historical And Current Section 10 Waters

Historic maps and aerial photographs that included the project site were reviewed to determine if portions of the site occur within Section 10 waters. This information included: 1) U. S. Fish and Wildlife Service National Wetland Inventory Maps for the Redwood Point and Palo Alto USGS Quadrangles (1985); 2) U. S. Coast and Geodetic Survey Charts for 1857; 3) 1970 aerial photograph from the *Soil Survey of San Mateo County, Eastern Part, and San Francisco County, California* (SCS 1991); and aerial photograph of the project area from February 2000.

Current Section 10 Waters in tidal waters includes tidal channels and adjacent special aquatic sites up to the limit of the mean high water mark (MHW) in areas currently exposed to fully tidal or muted-tidal action.

Historical Section 10 Waters occur behind levees, are currently not exposed to tidal or muted-tidal influence, and meet certain criteria. These criteria include: 1) the area is presently at or below mean high water (MHW); 2) the area was historically at or below MHW in its "unobstructed, natural state", and; 3) there is no evidence that the area was ever above MHW (Calvin Fong Memo, USACE, 1983).

Procedures for determining Historical Section 10 jurisdiction behind levees are as follows:

1. First, determine present MHW for the area in question.
    a. Use surveyed elevation data from the prospective applicant.
    b. If elevation data are not available, use the survey technique for determining MHW on the outboard side of the dike and project the MHW line back to the area in question.
    c. Those areas behind dikes that are presently above MHW are not subject to Section 10 permit requirements (provided they were above MHW prior to 28 January 1972 or were filled to above MHW thereafter under USACE permit) because they are presently at or above MHW.
    d. Those areas that are presently at or below MHW may be subject to Section 10 permit requirements. To determine whether these areas are subject to Section 10, two additional facts must be obtained (which are numbers 2 and 3 of the historical waters definition provided above).
2. The second step is to determine whether those areas presently at or below MHW were historically below MHW before the dikes were built.
    a. If available, use elevation data that were surveyed just prior to or just after the dikes were built. More often then not, this information is not available but potential sources include city and county planning commissions, public works departments, Caltrans, State Lands Commission, etc.
    b. If historic elevation data are not available, use the T-charts of 1850-90 to determine the location of the historic sloughs, if any, in those areas that are presently below MHW. The premise is that the historic sloughs were subject to the ebb and flow of the tides, and thus were below MHW.
    c. Those areas presently below MHW and historically below MHW as determined by elevation data or T-charts would be considered at or below MHW historically.
    d. Areas that were historically below MHW and filled above MHW (as shown by reliable data) but due to subsidence are now below MHW are not subject to Section 10 authority, but may be subject to Section 404 jurisdiction.

The MHW elevation in Redwood Creek was identified at Channel Marker No. 8 by Philip Williams & Associates (PWA 2000) as 3.44 feet NGVD. A table with tide characteristics and elevations (in NGVD and MLLW) is provided in the hydrologic existing conditions report (PWA 2000, Table 6).

SURVEY RESULTS

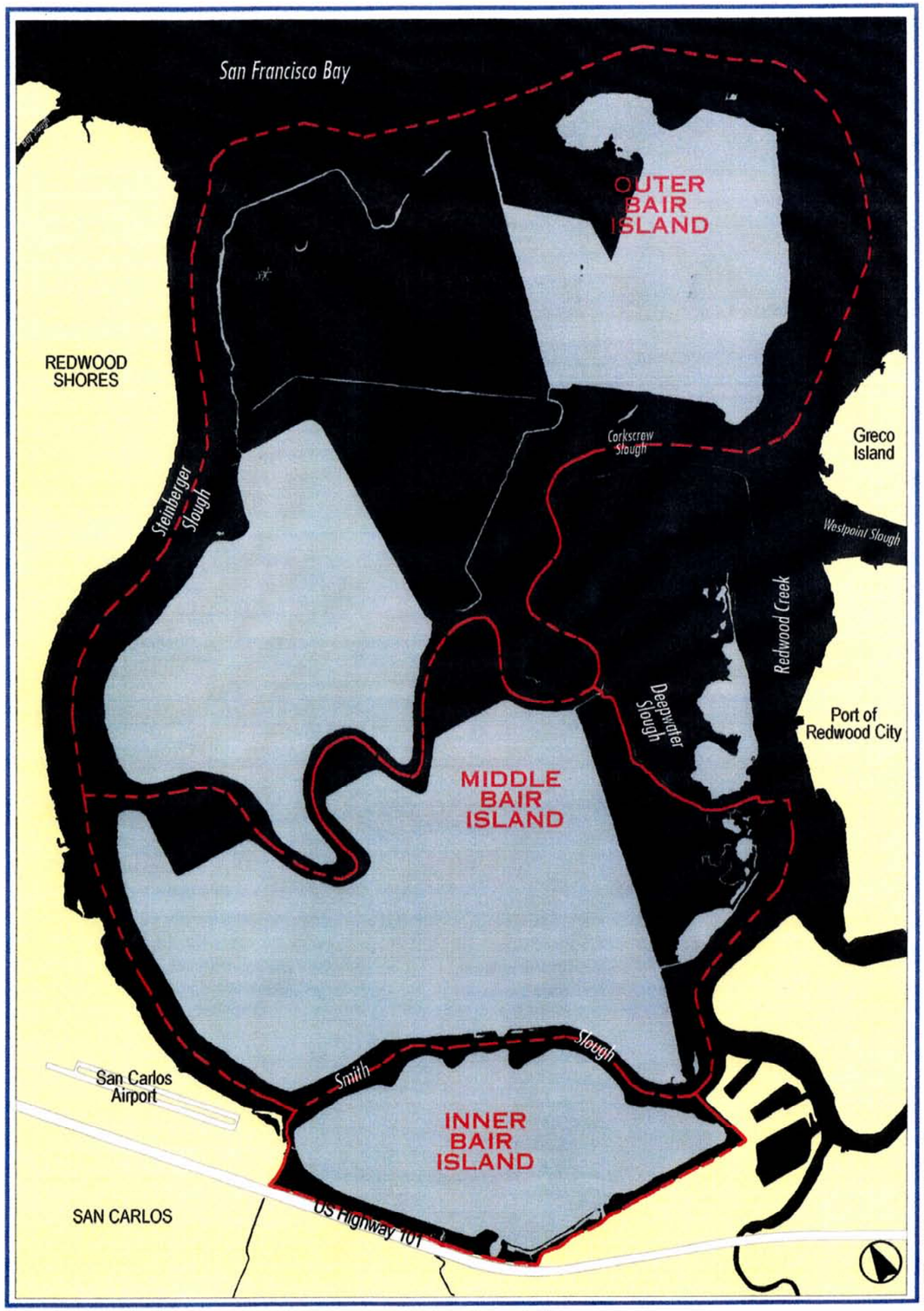
SUMMARY OF FINDINGS

Historically, the majority of the project area (see Table 1 and Figure 2) was exposed to the full ebb and flow of the tides. These habitats included tidal sloughs and channels, salt marshes above and below the MHW mark, transition zone wetlands extending up to the high tide line, salt pannes, and mud flats. This complex of habitats comprises several different categories of jurisdictional waters including Historical and Current Section 10, and Section 404 waters.

In the absence of reliable elevation data for the study area taken prior to the construction of the levees, the full extent of Historical Section 10 is approximated by the location of the historic sloughs presented in a T-chart taken from 1857 (Figure 2). In contrast, there are approximately 882.20 acres of Current Section 10 jurisdictional waters located within the project boundaries (Figure 7). These include the tidal salt marsh and shell mounds habitat types that are on the outboard side of the levees and are at an elevation at or below MHW. Current Section 10 jurisdictional waters include the majority of Outer Bair Island, as well as waters open to San Francisco Bay such as Corkscrew Slough and Smith Slough.

Section 404 waters were identified within the project boundaries and are presented in Figure 8. Approximately 2,259.32 acres of these habitats, including wetlands (1,992.76 acres) and other waters (266.56 acres; shell mounds, mud flats, salt pan and open water) were identified on site.

The remainder of the project site (i.e. uplands; approximately 375.82 acres) met none of the regulatory definitions of jurisdictional waters under Section 404 of the Clean Water Act nor Section 10 of the Rivers and Harbors Act. A summary of habitat acreages for the project site is presented in Table 4.



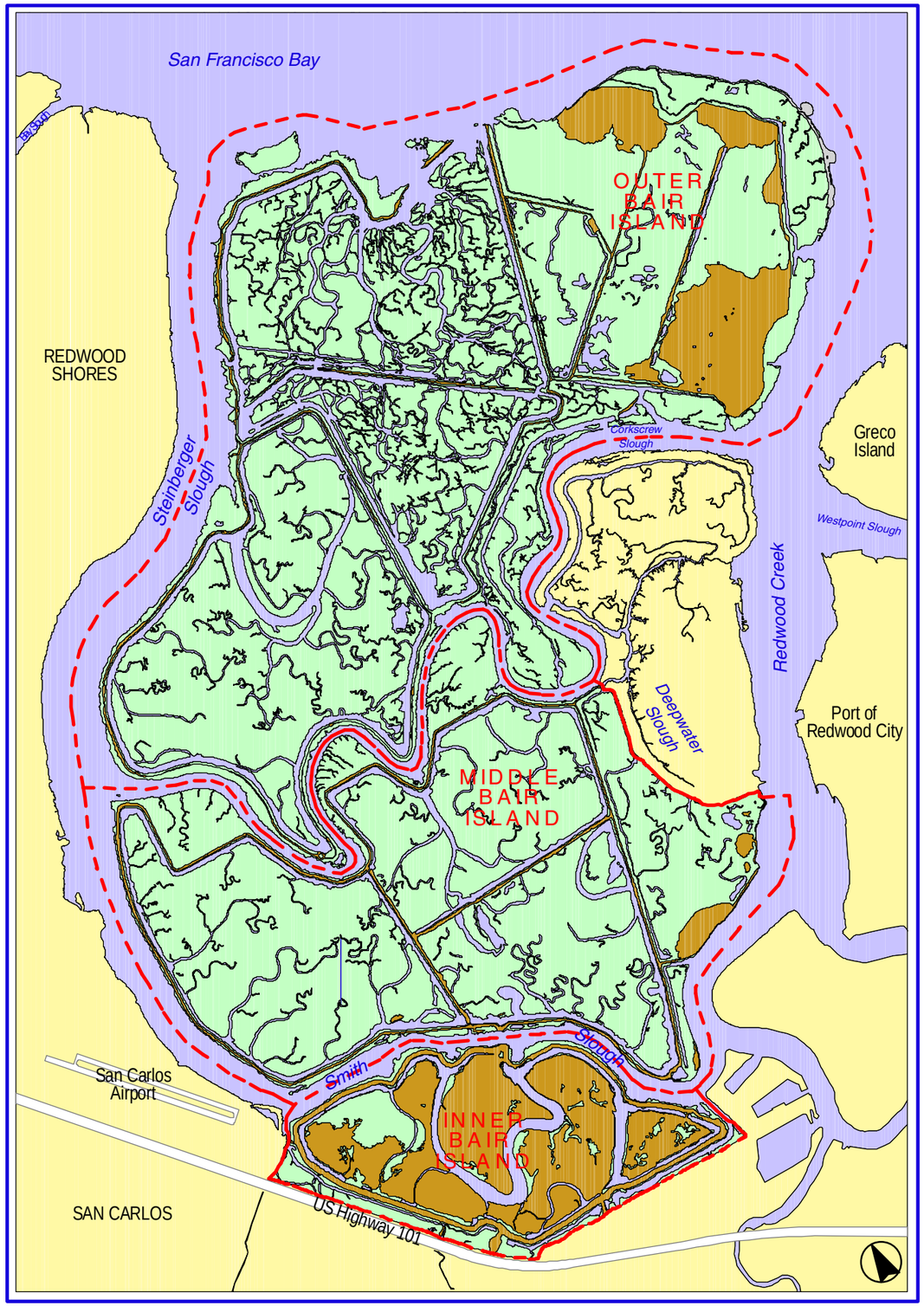
BAIR ISLAND RESTORATION PROJECT
FIGURE 7. SECTION 10 WATERS MAP

H.T. HARVEY & ASSOCIATES/GEOGRAPHIC COMPUTER TECHNOLOGIES

JUNE 2000 SCALE: 1 inch = 2,000 feet

Historic Section 10 Waters

Current Section 10 Waters



BAIR ISLAND RESTORATION PROJECT
FIGURE 8. WETLAND DELINEATION MAP

H.T. HARVEY & ASSOCIATES / GEOGRAPHIC COMPUTER TECHNOLOGIES

JUNE 2000 SCALE: 1 inch = 2,000 feet

Upland

SECTION 404 WATERS:

Open Water

Shell Mounds

Wetland

Table 5. Jurisdictional Habitat Acreages of the Bair Island Project Site.

HABITATS	ACRES
Upland:	**375.8**
Current Section 10-Jurisdictional Waters: (within project boundary)	**882.2**
Current Section 404-Jurisdictional Waters:	**2,259.3**
-Wetlands (within levees)	1,116.2
-Wetlands (associated with San Francisco Bay)	876.6
-Other Waters within levees (open water, mud flats, salt pannes)	260.9
-Other Waters associated with San Francisco Bay (shell mounds)	5.6
Total USACE Jurisdictional Area:	**2,259.3**

Information pertinent to the identification of jurisdictional waters assembled during the investigations is presented in four appendices located at the back of this report.

- Appendix A--Soils Descriptions
- Appendix B--USACE Data Forms
- Appendix C--Color Photographs

Observations/Rationale/Approach/Assumptions

- Due to several factors, the methodology used to describe and quantify the extent and distribution of potential jurisdictional waters within the defined project boundaries was modified somewhat from the approach commonly employed by following the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), definitions contained in federal regulations, and guidance provided in Regulatory Guidance Letters. These factors included: limited access to Outer and Middle Bair Islands; minimal direct impacts to these habitats during work intended to reintroduce tidal flows; complexity of habitats driven by varied micro-topographic relief resulting from diking, draining, placement of fill materials in the historical marshes, and differential settlement of these materials over time.

- As described above, the approach on Outer and Middle Bair Islands was to utilize the vegetation signatures on the aerial photographs for mapping these habitats with field verification. This task was conducted with a high degree of certainty as the vast majority of these two islands possess obvious wetland characteristics. The only exceptions are a few areas on the east side of Outer Bair Island that are at an elevation that is beyond tidal influence. These primarily upland habitats are interspersed with depressional wetlands resulting from differential settlement of fill materials. Access to these areas was possible during field surveys and wetland habitats were mapped as shown in Figure 8.

- Inner Bair Island posed the greatest challenge to mapping potential jurisdictional waters as this area is a complex of heterogeneously-distributed upland and wetland habitats. Mapping involved delineating obvious wetland and open water habitats on overlays of the aerial photographs with extensive field verification of those color signatures. It was not possible to use this approach to identify the multitude of minor topographic depressional wetlands that dot the landscape. **It is acknowledged that many wetland depressions were not mapped on Inner Bair Island. Such areas were either too small to accurately identify on the photographs and/or too numerous to include at this level of analysis.**

- Approximately 8 sample points were taken throughout the study areas. Information regarding field characteristics at each of the sample points was entered onto USACE Data Forms presented in Appendix C of this report.

- The 8 sample points were taken in characteristic habitat types identified from field surveys and habitat mapping of the entire Bair Island complex. These sample points were then assumed representative of those habitat types, and jurisdictional boundaries were placed based on the vegetation observed in the field and the habitat signatures on the aerial photography. We feel that this approach is appropriate for the purposes of restoration of these areas.

- Inner Bair consists largely of ruderal, non-native grassland. Diked salt marsh occurs along the edge of the borrow ditches and remnant slough channels. Additional wetlands occur throughout Inner Bair in areas where there are slight topographic depressions. Many of the soil characteristics in regards to color, mottling and gleying, were considered historical in nature and formed during a hydrologic regime that no longer exists today. On the other hand, modifications to topography have led to conditions on site that clearly have wetland hydrology and a predominance of wetland vegetation. Such areas, may have lacked clear hydric soil features only because enough time has not lapsed to allow such features to develop and surveys were not conducted during the rainfall season to directly monitored such features as redox potential in the soil profile. In such areas two parameters, hydrology and vegetation, were used to define wetland habitats as soils characteristics were seen to be unreliable indicators. For clarification, areas that possessed clear field characteristics of surface and/or subsurface hydrology and a predominance of

hydrophytic vegetation without current hydric soil features were included as potential jurisdictional wetlands.

- The vast majority of the project site consists of former salt ponds (Photograph A; Appendix C).

· The outboard side of the levees support bands of tidal salt marsh most of which are dominated by pickleweed (*Salicornia virginica*; Photograph B; Appendix C). All of the dominant plant species observed on site (and their wetland indicator status) can be found in the text of the report.

· Fill material consisting of dredge spoil has been historically deposited along the south side of Middle and Outer Bair, as well as throughout Inner Bair. Dominant plants were mostly upland species such as Italian ryegrass (*Lolium multiflorum*), ripgut brome (*Bromus diandrus*), black mustard (*Brassica nigra*), wild radish (*Raphanus sativus*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*) and wild oats (*Avena fatua*). Remnant hydric soils characteristics were found in some of these areas.

- The portions of the study area targeted for restoration are currently not tidally influenced. The primary source of water is surface runoff during the rainfall season and lateral seepage.

- Much of the area within the levees appears as a degraded marsh with substantial subsidence; existing salt marsh vegetation in these areas, such as pickleweed, generally appear to have a lower vigor and are sometimes covered with salt marsh dodder (*Cuscuta salina*; Photograph C, Appendix C).

AREAS MEETING THE REGULATORY DEFINITION OF JURISDICTIONAL WATERS

A) Identification of Jurisdictional Wetlands (Special Aquatic Sites)

Jurisdictional wetlands located within the levees are shown in Figure 5. The total size of these wetlands is approximately 1,116.19 acres. Field characteristics of hydrophytic vegetation, hydric soils and wetland hydrology were obtained at sample location numbers: 1A, 1C, 2A, 2B, 3A and 3B (Appendix B).

Vegetation. The dominant hydrophytic vegetation observed within wetlands was pickleweed (*Salicornia virginica*; OBL). Other hydrophytic vegetation included, cordgrass (*Spartina foliosa*; OBL) and alkali heath (*Frankenia salina*; FACW+).

Hydrology. Primary indicators of hydrophytic characteristics included inundation, saturated soils within the upper 12 inches, drift lines and surface deposits of salt and sediments. Secondary indicators included surface cracks and oxidized root channels.

Soils. Hydric soil indicators included gleyed soils and soils of low chroma, the presence of mottles, aquic moisture regime and listing on local hydric soils list (SCS 1992). Typical soil chroma values observed included 10YR 3/2 and 5YR 5/1.

Wetland habitats (tidal salt marsh) located on the outboard side of the levees at Bair Island totaled approximately 876.57 acres.

B) Identification of "Other Waters"

The remainder of jurisdictional waters on site, within the levees, were combined into a single category termed "other waters" including open water, salt pan, and mud flat. "Other waters" within the project site total approximately 260.93 acres. These habitats were devoid of vascular vegetation and were inundated.

C) Identification of Historical and Current Section 10 Waters

The entire study area including the levees was once tidal salt marsh situated along the perimeter of San Francisco Bay. Current Section 10 Waters includes those portions of the tract at or below MHW in areas currently exposed to tidal or muted-tidal influcence. These areas total approximately 882.20 acres.

AREAS NOT MEETING THE REGULATORY DEFINITION OF JURISDICTIONAL WATERS

Approximately 375.82 acres of the project site (uplands) did not meet the regulatory definition of jurisdictional waters (Figure 8). Field data were collected at sample location numbers 1B and 3B (Appendix B).

Vegetation characteristic of these upland habitats included: Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*; FAC), Italian ryegrass (*Lolium multiflorum*; FAC), wild radish (*Raphanus sativus*, UPL) black mustard (*Brassica nigra*; UPL), wild oats (*Avena fatua*, NOL), pickleweed, rabbitfoot grass (*Polypogon monspeliensis*; FACW+), common sow thistle (*Sonchus oleraceus*; NI), alkali heath (*Frankenia grandiflora*; FACW+), salt grass (*Distichlis spicata*, FACW), Italian thistle (*Carduus pycnocephalus*; UPL), ripgut brome (*Bromus diandrus*; UPL), and ice plant (*Carpobrotus edulis*, NOL).

The soils of these upland sites were located on fill material that included native soils dredged from the neighboring borrow ditch. Soil color varied due to the fill material. Typical soil chroma values observed included 10YR 3/3 and 7.5YR 3/4.

Field characteristics of wetland hydrology were entirely absent from these upland areas.

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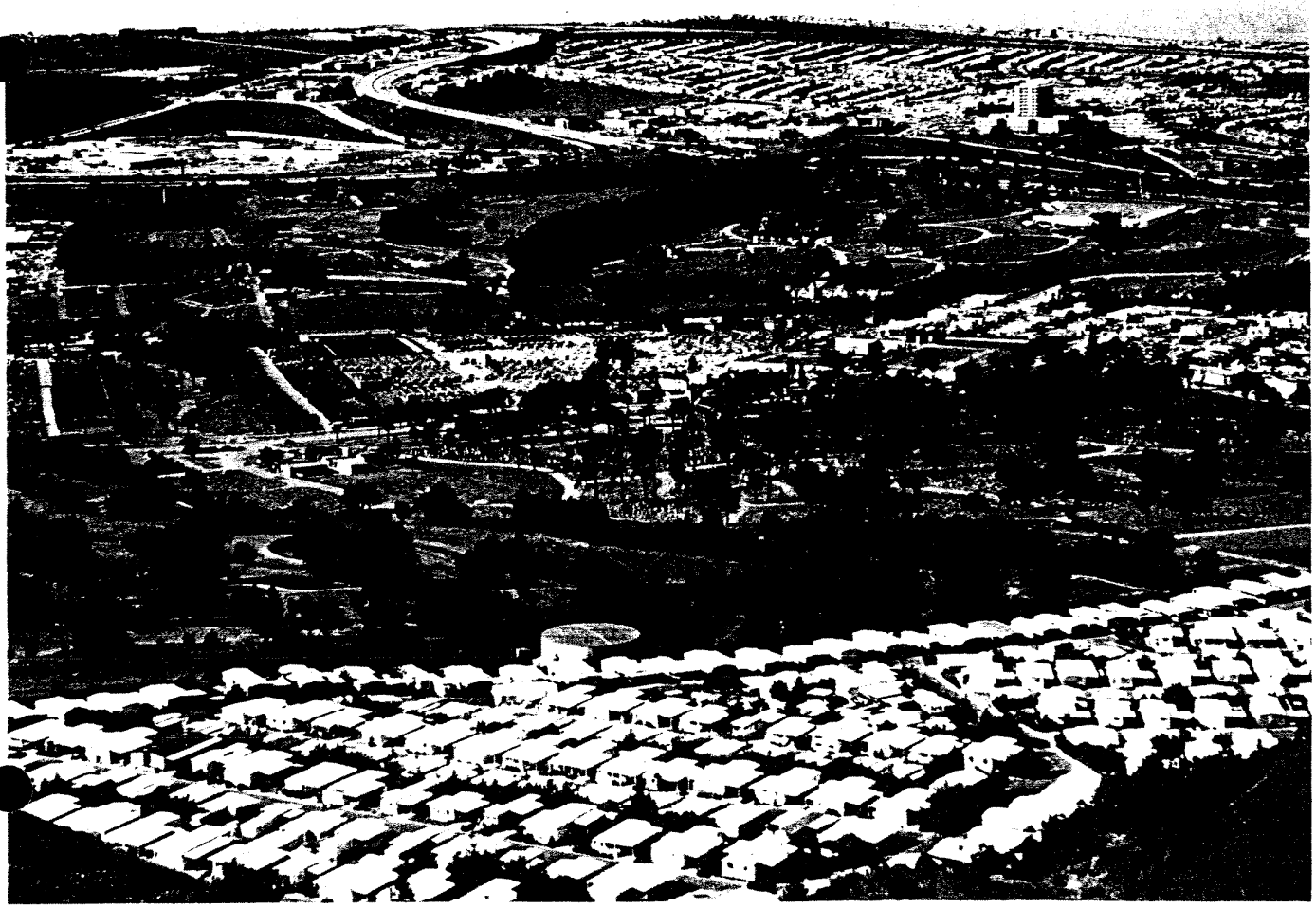
Appendix A.
Soils Descriptions

United States Department of Agriculture

Soil Conservation Service

In cooperation with the Regents of the University of California (Agricultural Experiment Station)

Soil Survey of San Mateo County, Eastern Part, and San Francisco County, California



clay loam, brown (7.5YR 5/4) moist; moderate medium and coarse subangular blocky structure; extremely hard, firm, sticky and plastic; many coarse roots and common fine and medium roots; common fine and medium tubular and interstitial pores; 3 percent angular pebbles 2 to 5 millimeters in diameter; common thin clay films on ped faces, in pores, and as bridges; neutral; gradual wavy boundary.

Bt3—27 to 37 inches; variegated light reddish brown (5YR 6/3) and reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; moderate medium and coarse subangular blocky structure; extremely hard, firm, sticky and plastic; many coarse roots and few fine and medium roots; common very fine and fine tubular and interstitial pores; 3 percent angular pebbles 2 to 5 millimeters in diameter; common thin clay films on ped faces and in pores; slightly acid; clear wavy boundary.

Cr—37 inches; soft, fractured sandstone; silty clay loam in fractures.

Bedrock is at a depth of 20 to 40 inches. The profile averages 0 to 10 percent gravel. Reaction is slightly acid or neutral throughout the profile. The difference between the mean summer soil temperature and the mean winter soil temperature is less than 9 degrees F.

The A horizon has color of 7/5YR 6/2, 6/3, or 6/4. Moist color is 7/5YR 3/2, 4/2, or 4/4.

The Bt horizon has color of 5YR 5/4, 6/3, or 6/4. Moist color is 5YR 4/4 or 4/6 or 7.5YR 4/6 or 5/4. Texture is clay loam or clay.

Miramar Series

The Miramar series consists of moderately deep, well drained soils on coastal uplands. These soils formed in material weathered from quartz-diorite. Slope ranges from 30 to 75 percent.

Soils of the Miramar series are fine-loamy, mixed, isomesic Pachic Argiustolls.

Typical pedon of Miramar loam, in an area of Scarper-Miramar complex, 30 to 75 percent slopes; about 0.5 mile north of Montara, on California Highway 1; 1,400 feet north and 750 feet east of the intersection of Highway 1 and Martini Creek (not sectionalized); Montara Mountain 7.5' Quadrangle:

A1—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; strong fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; many very fine and fine tubular and interstitial pores; 5 percent pebbles 2 to 7 millimeters in diameter; neutral; clear wavy boundary.

A2—7 to 15 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; moderate coarse subangular blocky structure parting to moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine tubular and interstitial pores; 5 percent pebbles 2 to 5 millimeters in diameter; slightly acid; clear wavy boundary.

Bt—15 to 24 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few very fine and fine roots; common very fine tubular pores; 5 percent pebbles 2 to 5 millimeters in diameter; slightly acid; clear wavy boundary.

BC—24 to 29 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 4/3) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few very fine and fine roots; common very fine tubular pores; 5 percent pebbles 2 to 5 millimeters in diameter; slightly acid; clear wavy boundary.

Cr—29 inches; weathered quartz-diorite that slakes in water.

Bedrock is at a depth of 20 to 40 inches. The profile averages 2 to 10 percent gravel. Reaction is slightly acid or neutral throughout the profile. The difference between the mean summer soil temperature and the mean winter soil temperature is less than 9 degrees F.

The A1 horizon has color of 10YR 3/2, 4/2, or 5/2. Moist color is 10YR 2/1, 2/2, 3/1, or 3/2.

The Bt horizon has color of 10YR 3/4, 5/3, 5/4, or 5/6. Moist color is 10YR 3/2 or 3/3. Texture is sandy clay loam or clay loam.

Novato Series

The Novato series consists of very deep, very poorly drained soils in tidal marshes along the margins of San Francisco Bay. These soils formed in alluvium derived from various kinds of rock. Slope ranges from 0 to 1 percent.

Soils of the Novato series are fine, mixed, nonacid, isomesic Typic Hydraquents.

Typical pedon of Novato clay, 0 to 1 percent slopes, near Foster City; 330 feet north on Beach Park

oulevard from its intersection with Foster City oulevard and 150 feet east of Beach Park Boulevard; 75 feet east of asphalt pavement on top of dike (not ctionalized); Redwood Point 7.5' Quadrangle:

Ag—0 to 6 inches; gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; common medium distinct dark yellowish brown (10YR 3/4, moist) mottles; massive; extremely hard, firm, sticky and plastic; many very fine roots; many very fine tubular pores and few fine and medium pores; moderately alkaline; clear irregular boundary.

A2g—6 to 16 inches; light olive gray (5Y 6/2) clay, variegated olive gray (5Y 4/2) and very dark gray (N 3/0) moist; common medium faint dark yellowish brown (10YR 3/4, moist) mottles; massive; extremely hard, firm, sticky and plastic; few very fine roots; moderately alkaline; diffuse smooth boundary.

C1g—16 to 30 inches; gray (5Y 5/1) clay, variegated dark gray (5Y 4/1) and dark greenish gray (5BG 4/1) moist; common medium distinct pale yellow (5Y 8/4, moist) jarosite mottles; massive; extremely hard, firm, sticky and plastic; moderately alkaline; iffuse smooth boundary.

2g—30 to 45 inches; dark gray (10YR 4/1) clay, very dark gray (N 3/0) moist; massive; extremely hard, firm, sticky and plastic; moderately alkaline; diffuse smooth boundary.

C3g—45 to 60 inches; gray (5Y 6/1) clay, very dark gray (N 3/0) moist; massive; extremely hard, firm, sticky and plastic; moderately alkaline.

These soils are saturated with water year round. The value is more than 1. Sulfidic material is below a epth of 20 inches. The content of organic matter decreases irregularly with increasing depth. The profile is strongly alkaline or moderately alkaline throughout nd is noncalcareous.

The Ag horizon has color of 5Y 5/1, 5/2, or 6/2 or of 2.5Y 5/2 or 6/2. Moist color is 5Y 4/1 or 4/2, N 3/0, or 2.5Y 3/2 or 4/2. The horizon has common medium istinct or faint mottles that have color of 10YR 3/4.

The Cg horizon has color of 10YR 4/1, of 5Y 4/2, 5/1, 6/1, or 6/2, or of N 5/0 or 6/0. Moist color is 5Y 4/1 or 6/2, 2.5Y 4/1 or 4/2, N 2/0 or 3/0, or 5BG 4/1. Common medium distinct jarosite mottles that have color of 5Y 8/4 are in most pedons. Texture is silty clay, clay, or ilty clay loam.

Obispo Series

The Obispo series consists of shallow, well drained soils on gently rolling to hilly uplands. These soils formed in material weathered from hard, serpentinitic rock. Slope ranges from 5 to 30 percent.

Soils of the Obispo series are clayey, serpentinitic, thermic Lithic Haploxerolls.

Typical pedon of Obispo clay, 5 to 15 percent slopes; 3,200 feet south on Skyline Boulevard from its intersection with Hayne Road and 10 feet west of Skyline Boulevard (not sectionalized); San Mateo 7.5' Quadrangle:

A1—0 to 4 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; strong fine granular structure and strong coarse subangular blocky structure; extremely hard, firm, sticky and plastic; many very fine roots; few very fine and fine tubular and interstitial pores; moderately alkaline; clear irregular boundary.

A2—4 to 12 inches; very dark gray (10YR 3/1) clay, very dark brown (10YR 2/2) moist; strong coarse and very coarse subangular blocky structure; extremely hard, firm, sticky and plastic; common very fine roots; few very fine and fine tubular and interstitial pores; moderately alkaline; abrupt irregular boundary.

R—12 inches; hard, serpentinitic rock.

Unweathered serpentine is at a depth of 10 to 20 inches. The profile averages 0 to 10 percent gravel. Unless the soils are irrigated, cracks 0.5 inch to 3.0 inches wide extend to bedrock and remain open in summer until it rains.

The A1 horizon has color of 10YR 3/1 or 4/1. Moist color is 10YR 2/1, 2/2, or 3/1.

The A2 horizon has color of 10YR 3/1 or 4/1. Moist color is 10YR 2/2 or 3/1. Texture is clay or clay loam.

Orthents

Orthents are very shallow to very deep, very poorly drained to excessively drained soils on uplands, including hills and ridgetops; alluvial fans; coastal terraces; flood plains; and tidal flats. These soils formed in alluvium derived from various kinds of rock; sandy coastal deposits; hard and soft sandstone, shale, siltstone, serpentine, and volcanic rock; and various manmade fill material. Slope is 0 to 75 percent.

Reference pedon of Orthents, cut and fill, 15 to 75 percent slopes, at Oceana High School in Pacifica; 750 feet east and 4,200 feet north of the intersection of Highway 1 and Sharp Park Road (not sectionalized); San Francisco South 7.5' Quadrangle:

A—0 to 4 inches; dark yellowish brown (10YR 4/4)

gravelly loam, dark brown (10YR 3/3) moist; strong fine, medium, and coarse subangular blocky structure; hard, firm, sticky and plastic; many very fine roots; slightly acid; clear irregular boundary.

Cr—4 inches; light olive brown (2.5Y 5/4), soft, fractured, slightly metamorphosed sandstone, olive brown (2.5Y 4/4) moist.

These soils are extremely variable. They consist of areas of undisturbed loamy material on coastal terraces; areas that have been mechanically altered for residential and other urban uses and have cuts that have slopes of 3:1 to 1.5:1 and fills that are 0 to 75 feet deep or more; smoothed areas on alluvial fans and plains; reclaimed areas near San Francisco Bay; and areas on the margins of the bay that consist of earthy material, rock fragments, plant matter, and manmade debris.

Reyes Series

The Reyes series consists of very deep, somewhat poorly drained soils that formed in alluvium derived from various kinds of rock. These soils are on reclaimed tidelands along the margins of San Francisco Bay. Slope is 0 to 1 percent.

Soils of the Reyes series are fine, mixed, acid, thermic Sulfic Fluvaquents.

Typical pedon of Reyes clay, 0 to 1 percent slopes; 670 feet north of gate on dirt road at the eastern end of Whipple Avenue, in Redwood City, and 110 feet west of dirt road (not sectionalized); Redwood Point 7.5' Quadrangle:

Ap—0 to 9 inches; gray (10YR 6/1) clay, very dark grayish brown (10YR 3/2) moist; common fine distinct strong brown (7.5YR 5/6, moist) mottles; moderate fine, medium, and coarse subangular blocky structure; extremely hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular and interstitial pores; strongly acid; clear irregular boundary.

A—9 to 22 inches; gray (5YR 5/1) clay, dark gray (10YR 4/1) moist; many fine distinct dark yellowish brown (10YR 4/6) mottles, yellow (10YR 7/6) moist; moderate fine, medium, and coarse subangular blocky structure; extremely hard, firm, sticky and plastic; common very fine roots; common very fine and fine tubular pores and few medium and coarse interstitial pores; very strongly acid; clear smooth boundary.

Cg—22 to 30 inches; gray (5Y 6/1) clay, dark gray (5Y 4/1) moist; common fine distinct pale yellow (5Y 8/3) jarosite mottles, very pale brown (10YR 7/4) moist; massive; extremely hard, firm, sticky and plastic; few very fine tubular pores and common medium and coarse interstitial pores; very strongly acid; clear smooth boundary.

C2g—30 to 60 inches; gray (5Y 6/1) clay, dark greenish gray (5GY 4/1) moist; few jarosite mottles; massive; extremely hard, firm, sticky and plastic; moderately alkaline.

The content of organic matter in the profile decreases irregularly with increasing depth. These soils are artificially drained. The N value ranges from 0.3 to 0.7. Jarosite mottles are at a depth of 20 to 40 inches.

The A horizon has color of 10YR 5/1, 5/2, 6/1, or 6/2 or of 2.5Y 5/2 or 6/2. Moist color is 10YR 3/2, 3/3, 4/1, or 4/2 or 2.5Y 3/2 or 4/2. The horizon has few to many fine or medium distinct mottles that have color of 5YR 4/3, 4/4, or 4/6, of 7.5YR 4/6 or 5/6, or of 10YR 4/6. Reaction is strongly acid or very strongly acid.

The B horizon has color of 10YR or 5Y 5/1, 5/2, 6/1, or 6/2 or of N 5/0 or 6/0. Moist color is 10YR or 5Y 4/1 or 5/1 or N 4/0 or 5/0. The horizon has distinct or prominent mottles that have hue of 5Y, 2.5Y, 10YR, 7.5YR, or 5YR. Moist value of the mottles commonly is 4, but it is 5 in areas where hue is 5Y or 2.5Y. The lower part of the B horizon has many or common jarosite mottles that have color of 2.5Y 7/6, 8/6, or 8/8 or of 5Y 7/6, 7/8, 8/3, 8/6, or 8/8.

The C horizon has color of 5Y 6/1 or 6/2. Moist color is 5Y 4/1 or 5/1, N 4/0 or 5/0, or 5GY 4/1. The horizon has few or common fine or medium distinct or prominent jarosite mottles. Reaction is very strongly acid to medium acid in drained areas and is moderately alkaline in saturated areas. Texture is clay or silty clay.

Scarper Series

The Scarper series consists of moderately deep, well drained soils on uplands. These soils formed in material weathered from quartz-diorite. Slope ranges from 30 to 75 percent.

Soils of the Scarper series are coarse-loamy, mixed, isomesic Typic Haplustolls.

Typical pedon of Scarper gravelly coarse sandy loam, in an area of Scarper-Miramar complex, 30 to 75 percent slopes; 7,700 feet east and 1,500 feet north of Point Montara Lighthouse (not sectionalized); Montara Mountain 7.5' Quadrangle:

A1—0 to 5 inches; dark grayish brown (10YR 4/2)

Tech Guide Notice #12 4/17/92

HALF MOON BAY, CA Field Office
March, 1992
SECTION II
FIELD OFFICE TECHNICAL GUIDE

HYDRIC SOIL LISTS

USDA - Soil Conservation Service
Davis, California (March 1992)

INTRODUCTION

Hydric soils are developed under sufficiently wet conditions to support growth and regeneration of hydrophytic vegetation. More specifically, hydric soils are ones that meet the definition and criteria developed by the National Technical Committee for Hydric Soils (NTCHS). The criteria are selected soil properties that are documented in Soil Taxonomy (Soil Survey Staff, 1975, 1990) and Soil Interpretations Records (Soil Survey Staff, 1983). The NTCHS is chaired by Soil Conservation Service (SCS). Members include representatives from the U.S. Army Corps of Engineers, U. S. Fish and Wildlife Service, Environmental Protection Agency, Agricultural Experiment Stations, U. S. Forest Service and the Bureau of Land Management.

KINDS OF LISTS OF HYDRIC SOILS

The SCS maintains three kinds of lists of hydric soils.

1. National List of Hydric Soils. This is a listing of soil series mapped in the United States that meet hydric soil criteria. This list includes soil series that may or may not have been drained. Some series, designated as hydric have phases that are not hydric depending on water table, flooding and ponding characteristics. Refer to Soil Survey Area List of Hydric Soil Map Units for specific information. The NTCHS is responsible for reviewing and approving changes to this list. It is contained in the publication "Hydric Soils of the United States, 1985". A second edition was published in December 1987 and a third edition in June 1991. This general list is maintained in a computer file and is updated annually. The most current national list from the computer file may be obtained for the cost of printing from the SCS Project Manager, Statistical Laboratory, Iowa State University, 217 Snedecor Hall, Ames, IA 50011.

2. State List of Hydric Soils. This is a subset of the National List of Hydric Soils for specific states. The California list may be obtained from the SCS State Soil Scientist, 2121-C 2nd Street, Davis, CA 95616.

3. Soil Survey Area List of Hydric Soil Map Units. SCS maintains a local list of hydric soil map units for each soil survey area in the Field Office Technical Guide. Each soil survey area encompasses all or a portion of a county. These are the most specific of the three kinds of lists. They identify the soil map units that contain or may in some delineations contain hydric soils. These lists have the advantage, when used with the local soil survey report map sheets, of indicating the geographic distribution of hydric soils within a given area. A conventional and Special Symbols Legend is attached to the list. These symbols may appear on the soil survey maps. Hydric soils may occur in areas designated by the Water Features symbols.

COLUMNS ON THE SOIL SURVEY AREA LIST OF HYDRIC SOIL MAP UNITS

Map Symbol: A soil map unit symbol is listed for every map unit in the soil survey area. The symbols on the list correspond to the symbols presented in the soil survey report and map sheets.

Map Unit Name: A soil map unit name is listed for every map unit in the soil survey area. The individual components of the soil map unit are listed directly below the map unit name, preceeded by either a "(C)" or "(I)". The "(C)" signifies a major component, which is therefore a part of the map unit name. The "(I)" signifies a component of minor extent – an inclusion – which is not a part of the map unit name.

Hyd?: For each component or inclusion listed, "Y" indicates, yes, the soil is hydric and "N", no, indicates the soil is not hydric.

Hydric Criteria: Codes indicating the NTCHS criteria that are met are listed. (See page 3)

Hydric Landforms: The probable landscape position within the soil map unit delineation is given for each listed hydric soil.

FSA Items: Information required for FSA implementation purposes as per National Food Security Act Manual, Section 512.12, is listed. The entries 1 through 5 signify the following: (1) hydric only because of saturation, (2) support woody vegetation under natural conditions, (3) contain potholes or playas, (4) are seasonally flooded or ponded, and (5) can be farmed under natural conditions without removing woody vegetation or other manipulation.

Footnotes: A number indicates that a footnote pertinent to the listed hydric soil is given on the last page of the hydric soil list. Some footnotes identify soils that have altered conditions, and soil characteristics indicate that hydric soil conditions existed prior to alteration of drainage or flooding. Other footnotes indicate that soil properties range across the hydric soil criteria. On-site investigation may be required.

NOTES ON USES AND LIMITATIONS OF THE LISTS

The lists have a number of agricultural and nonagricultural applications. These include assistance in land-use planning, conservation planning, and assessment of potential wildlife habitat. A combination of hydric soil, hydrophytic vegetation, and hydrology criteria defines wetlands as described in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Federal Interagency Committee for Wetland Delineation, 1989). Therefore an area that meets hydric soil criteria must also meet hydrophytic vegetation and wetland hydrology criteria in order for it to be classified as a jurisdictional wetland.

The Soil Survey Area Lists of Hydric Soil Map Units identify hydric soil components and hydric soil inclusions. Inclusions are soil components of minor extent and may need to be located by on-site investigation.

DEFINITION OF HYDRIC SOIL (NTCHS, June, 1991)

A hydric soil is a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. The following criteria reflect those soils that meet this definition.

CRITERIA FOR HYDRIC SOILS (NTCHS, June, 1991)

1. All Histosols except Folists, or

2. Soils in Aquic suborder, Aquic subgroups, Albolls suborder, Salorthids great group, Pell great groups of Vertisols, Pachic subgroups, or Cumulic subgroups that are:

a. somewhat poorly drained and have a frequently occurring water table at less than 0.5 (ft) feet from the surface for a significant period (usually more than 2 weeks) during the growing season, or

b. poorly drained or very poorly drained and have either:

(1) a frequently occurring water table at less than 0.5 feet from the surface for a significant period (usually more than 2 weeks) during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches (in), or for other soils

(2) a frequently occurring water table at less than 1.0 foot from the surface for a significant period (usually more than 2 weeks) during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within 20 inches, or

(3) a frequently occurring water table at less than 1.5 feet from the surface for a significant period (usually more than 2 weeks) during the growing season if permeability is less than 6.0 in/hr in any layer within 20 inches, or

3. Soils that are frequently ponded for long duration or very long duration during the growing season, or

4. Soils that are frequently flooded for long duration or very long duration during the growing season.

FIELD OFFICE OFFICIAL LIST OF HYDRIC SOIL MAP UNITS
FOR
SAN MATEO COUNTY, EASTERN PART, AND SAN FRANCISCO COUNTY, CALIFORNIA

Map Units are listed in alpha-numeric order by map unit symbol. The 'HYDRIC CRITERIA' column refers to criteria defined in 'Hydric Soils of the United States' (USDA Miscellaneous Publication No. 1491 June, 1991.) The 'FSA ITEMS' column contains information needed for Food Security Act determinations required by Section 512.11(h)(4) of the National Food Security Act Manual (August 1991).

March 25, 1992

Soil Survey Area No.: CA689
Soil Survey Name: SAN MATEO COUNTY, EASTERN PART, AND SAN FRANCISCO COUNTY, CALIFORNIA

Map Symbol	Map Unit Name (C) Component (I) Inclusion	Hyd?	Hydric Criteria	Hydric Landforms	FSA Items	Footnotes
101	ACCELERATOR-FAGAN ASSOCIATION, 5 TO 15 PERCENT SLOPES					
	(C) ACCELERATOR	N				
	(C) FAGAN	N				
102	ACCELERATOR-FAGAN-URBAN LAND COMPLEX, 5 TO 15 PERCENT SLOPES					
	(C) ACCELERATOR	N				
	(C) FAGAN	N				
	(C) URBAN LAND	N				
103	ALAMBIGUE SANDY LOAM, 15 TO 75 PERCENT SLOPES					
	(C) ALAMBIGUE	N				
104	ALAMBIGUE-MCGARVEY COMPLEX, 30 TO 75 PERCENT SLOPES					
	(C) ALAMBIGUE	N				
	(C) MCGARVEY	N				
105	BARNABE-CANDLESTICK COMPLEX, 30 TO 75 PERCENT SLOPES					
	(C) BARNABE	N				
	(C) CANDLESTICK	N				
106	BARNABE-ROCK OUTROCK COMPLEX, 15 TO 75 PERCENT SLOPES					
	(C) BARNABE	N				
	(C) ROCK OUTROCK	N				

March 25, 1992

Soil Survey Area No.: CA689
Soil Survey Name: SAN MATEO COUNTY, EASTERN PART, AND SAN FRANCISCO COUNTY, CALIFORNIA

Map Symbol	Map Unit Name (C) Component (I) Inclusion	Hyd?	Hydric Criteria	Hydric Landforms	FSA Items	Footnotes
107	BOTELLA LOAM, 0 TO 5 PERCENT SLOPES					
	(C) BOTELLA	N				
108	BOTELLA-URBAN LAND COMPLEX, 0 TO 5 PERCENT SLOPES					
	(C) BOTELLA	N				
	(C) URBAN LAND	N				
109	CANDLESTICK-BARNABE COMPLEX, 30 TO 50 PERCENT SLOPES					
	(C) BARNABE	N				
	(C) CANDLESTICK	N				
110	CANDLESTICK-KRON-BUR IBURI COMPLEX, 30 TO 75 PERCENT SLO PES					
	(C) BURIBURI	N				
	(C) CANDLESTICK	N				
	(C) KRON	N				
111	CANDLESTICK VARIANT LOAM, 2 TO 15 PERCENT SLOPES					
	(C) CANDLESTICK VARIANT	N				
112	CANDLESTICK VARIANT LOAM, 15 TO 30 PERCENT SLOPES					
	(C) CANDLESTICK VARIANT	N				
113	FAGAN LOAM, 15 TO 50 PERCENT SLOPES					
	(C) FAGAN	N				
114	FRANCISQUITO-URBAN LAND COMPLEX, 5 TO 15 PERCENT SLOPES					
	(C) FRANCISQUITO	N				
	(C) URBAN LAND	N				

March 25, 1992

Soil Survey Area No.: CA689
Soil Survey Name: SAN MATEO COUNTY, EASTERN PART, AND SAN FRANCISCO COUNTY, CALIFORNIA

Map Symbol	Map Unit Name (C) Component (I) Inclusion	Hyd?	Hydric Criteria	Hydric Landforms	FSA Items	Footnotes
115	LOS GATOS LOAM, 30 TO 75 PERCENT SLOPES					
	(C) LOS GATOS	N				
116	MAYMEN GRAVELLY LOAM, 30 TO 50 PERCENT SLOPES					
	(C) MAYMEN	N				
117	NOVATO CLAY, 0 TO 1 PERCENT SLOPES					
	(C) NOVATO	Y	2B3,3	Salt Marsh	4	
118	NOVATO CLAY, 0 TO 1 PERCENT SLOPES PONDED					
	(C) NOVATO	Y	2B3,3	Salt Marsh	4	
119	OBISPO CLAY, 5 TO 15 PERCENT SLOPES					
	(C) OBISPO	N				
120	OBISPO CLAY, 15 TO 30 PERCENT SLOPES					
	(C) OBISPO	N				
121	ORTHENTS, CUT AND FILL, 0 TO 15 PERCENT SLOPES					
	(C) ORTHENTS	N				
122	ORTHENTS, CUT AND FILL, 15 TO 75 PERCENT SLOPES					
	(C) ORTHENTS	N				
123	ORTHENTS, CUT AND FILL-URBAN LAND COMPLEX, 0 TO 5					
	(C) ORTHENTS	N				
	(C) URBAN LAND	N				

March 25, 1992

Soil Survey Area No.: CA689
Soil Survey Name: SAN MATEO COUNTY, EASTERN PART, AND SAN FRANCISCO COUNTY, CALIFORNIA

Map Symbol	Map Unit Name (C) Component (I) Inclusion	Hyd?	Hydric Criteria	Hydric Landforms	FSA Items	Footnotes
124	ORTHENTS, CUT AND FILL-URBAN LAND COMPLEX, 5 TO 75 PERCENT SLOPES					
	(C) ORTHENTS	N				
	(C) URBAN LAND	N				
125	PITS AND DUMPS					
	(C) DUMPS	N				
	(C) PITS	N				
126	REYES CLAY, 0 TO 1 PERCENT SLOPES					
	(C) REYES	Y	2B3	Tidal Marsh	1	1
	(I) UNNAMED	Y	3	Tidal Marsh	4	
127	ROCK OUTCROP-ORTHENTS COMPLEX, 30 TO 75 PERCENT SLOPES					
	(C) ORTHENTS	N				
	(C) ROCK OUTCROP	N				
128	SCARPER-MIRAMAR COMPLEX, 30 TO 75 PERCENT SLOPES					
	(C) MIRAMAR	N				
	(C) SCARPER	N				
129	SIRDRAK SAND, 5 TO 50 PERCENT SLOPES					
	(C) SIRDRAK	N				
	(I) TIDAL FLATS	Y	2A,3,4	Tidal Flat	4	
	(I) BEACHES	Y	2A,3,4	Beach	4	
130	TYPIC ARGIUSTOLLS, LOAMY-URBAN LAND ASSOCIATION, 5 TO 1 5 PERCENT SLOPES					
	(C) TYPIC ARGIUSTOLLS	N				
	(C) URBAN LAND	N				

March 25, 1992

Soil Survey Area No.: CA689
Soil Survey Name: SAN MATEO COUNTY, EASTERN PART, AND SAN FRANCISCO COUNTY, CALIFORNIA

Map Symbol	Map Unit Name (C) Component (I) Inclusion	Hyd?	Hydric Criteria	Hydric Landforms	FSA Items	Footnotes
131	URBAN LAND					
	(C) URBAN LAND	N				
132	URBAN LAND-ORTHENTS, CUT LAND FILL COMPLEX, 0 TO 5 PERCENT SLOPES					
	(C) ORTHENTS	N				
	(C) URBAN LAND	N				
133	URBAN LAND-ORTHENTS, CUT AND FILL COMPLEX, 5 TO 75 PERCENT SLOPES					
	(C) ORTHENTS	N				
	(C) URBAN LAND	N				
134	URBAN LAND-ORTHENTS, RECLAIMED COMPLEX, 0 TO 2 PERCENT SLOPES					
	(C) ORTENTS	N				
	(C) URBAN LAND	N				
	(I) NOVATO	Y	2B3,3	Salt Marsh	4	
135	URBAN LAND-ORTHENTS, SMOOTHED COMPLEX, 5 TO 50 PERCENT SLOPES					
	(C) ORTHENTS	N				
	(C) URBAN LAND	N				
136	URBAN LAND-SIRDRAK COMPLEX, 2 TO 50 PERCENT SLOPES					
	(C) SIRDRAK	N				
	(C) URBAN LAND	N				
137	ZENI-ZENI VARIANT GRAVELLY LOAMS, 30 TO 75 PERCENT SLOPES					
	(C) TAMALPAIS	N				
	(C) ZENI	N				

March 25, 1992

Soil Survey Area No.: CA689
Soil Survey Name: SAN MATEO COUNTY, EASTERN PART, AND SAN FRANCISCO COUNTY, CALIFORNIA

Map Symbol	Map Unit Name (C) Component (I) Inclusion	Hyd?	Hydric Criteria	Hydric Landforms	FSA Items	Footnotes
W	WATER					
	(C) WATER	Y				

Footnotes:

1. Hydrology has been altered in some or all areas of this map unit through drainage and/or protection from flooding. Soil characteristics indicate that hydric soil conditions existed prior to alteration of drainage.

Appendix B.
USACE Data Forms

SOILS

Sample Number
1A

Map Unit Name
(Series and Phase) Fill material on top of Reyes Clay, 0-1% slopes

Taxonomy (Subgroup):Sulfic Fluvaquent

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10 YR 3/2	7.5 YR 4/6	few/distinct	clay loam
12-	A	5 YR 5/1	10 YR 4/6	few/distinct	clay

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Suffidic Odor		Organic Streaking in Sandy Soils
x	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
x	Gleyed or Low-Chroma colors		Other (Explain in Remarks

Remarks:
Upper soil layer highly disturbed by fill and likely past disking.

WETLAND DETERMINATION

	(Circle)
Hydrophytic Vegetation Present?	(Yes) No
Wetland Hydrology Present?	(Yes) No
Hydric Soils Present?	(Yes) No

(Circle)

Is this Sampling Point Within a Wetland? (Yes) No

Remarks:
Sample point occurs in pickleweed dominated topographic depression (remnant slough channel).

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
1A

Project/Site: Bair Island
Applicant/Owner: San Francisco Bay Wildlife Society
Investigator: J. Bourgeois, P. Boursier

Date: April 27, 2000
County: San Mateo
State: California

Do Normal Circumstances exist on the site? Yes (No)

Is the site significantly disturbed (Atypical Situations?) Yes (No)

Is the area a potential Problem Area? Yes (No)

(If needed, explain on reverse.)

Community ID: Diked Saltmarsh

Transect ID : 1

Plot ID: A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salicornia virginica*	H	OBL	9.		
2. *Polypogon monspeliensis*	H	FACW+	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

Recorded Data (describe in Remarks):

_____ Stream, Lake, or Tide Gauge
_____ Aerial Photographs
_____ Other
x No Recorded Data Available

Field Observation:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: 12 (in.)

Depth to Saturated Soil 8 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

_____ Inundated
x Saturated
_____ Water Marks
X Drift Lines
_____ Sediment Deposits
_____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

x Oxidized Root Channels in Upper 12 in.
_____ Water-Stained Leaves
_____ Local Soil Survey Data
X FAC-Neutral Test
_____ Other (Explain in Remarks)

Remarks:

SOILS

Sample Number
1B

Map Unit Name
(Series and Phase) Fill material on top of Reyes Clay, 0-1% slopes

Drainage Class:
Field Observations:

Taxonomy (Subgroup): Sulfic Fluvaquent

Confirm Mapped Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-24	A	10 YR 3/3	---	none	clay loam
24-	A	5 YR 5/2	10 YR 4/6	few/distinct	clay

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Suffidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
x	Gleyed or Low-Chroma colors		Other (Explain in Remarks

Remarks:
Deep layer of fill on surface; evidence of disturbance/disking.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	Yes (No)	(Circle)
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
1C

Project/Site: Bair Island
Applicant/Owner: San Francisco Bay Wildlife Society
Investigator: J. Bourgeois, P. Boursier

Date: April 27, 2000
County: San Mateo
State: California

Do Normal Circumstances exist on the site? Yes (No)

Is the site significantly disturbed (Atypical Situations?) Yes (No)

Is the area a potential Problem Area? Yes (No)

(If needed, explain on reverse.)

Community ID: Seasonal Wetland

Transect ID : 1

Plot ID: C

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Polypogon monspeliensis*	H	FACW+	9.		
2. *Frankenia salina*	H	FACW+	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

Recorded Data (describe in Remarks):

- ____ Stream, Lake, or Tide Gauge
- ____ Aerial Photographs
- ____ Other
- x No Recorded Data Available

Field Observation:

- Depth of Surface Water: --- (in.)
- Depth to Free Water in Pit: 18 (in.)
- Depth to Saturated Soil 10 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

- ____ Inundated
- x Saturated
- ____ Water Marks
- ____ Drift Lines
- ____ Sediment Deposits
- ____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- x Oxidized Root Channels in Upper 12 in.
- ____ Water-Stained Leaves
- ____ Local Soil Survey Data
- X FAC-Neutral Test
- ____ Other (Explain in Remarks)

Remarks:

SOILS

Sample Number
1C

Map Unit Name
(Series and Phase) Fill material on top of Reyes Clay, 0-1% slopes

Taxonomy (Subgroup): Sulfic Fluvaquent

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10 YR 3/2	---	none	clay loam
12-	A	5 YR 5/1	10 YR 4/6	few/distinct	clay

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Suffidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma colors		Other (Explain in Remarks

Remarks:
Evidence of disturbance/disking in upper fill layer.

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	(Yes) No	
Wetland Hydrology Present?	(Yes) No	(Circle)
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:
Low point in fill material surface; depressional wetland, close to clay soil layer; seasonally flooded.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
1B

Project/Site: Bair Island
Applicant/Owner: San Francisco Bay Wildlife Society
Investigator: J. Bourgeois, P. Boursier

Date: April 27, 2000
County: San Mateo
State: California

Do Normal Circumstances exist on the site? Yes (No)

Is the site significantly disturbed (Atypical Situations?) Yes (No)

Is the area a potential Problem Area? Yes (No)

(If needed, explain on reverse.)

Community ID: Ruderal Upland

Transect ID : 1

Plot ID: B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lolium multiflorum*	H	FAC	9.		
2. *Raphanus sativus*	H	UPL	10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50%

Remarks:

HYDROLOGY

Recorded Data (describe in Remarks):

_____ Stream, Lake, or Tide Gauge
_____ Aerial Photographs
_____ Other
x No Recorded Data Available

Field Observation:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

_____ Inundated
_____ Saturated
_____ Water Marks
_____ Drift Lines
_____ Sediment Deposits
_____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

_____ Oxidized Root Channels in Upper 12 in.
_____ Water-Stained Leaves
_____ Local Soil Survey Data
_____ FAC-Neutral Test
_____ Other (Explain in Remarks)

Remarks: No hydrologic indicators observed.

SOILS

Sample Number
1C

Map Unit Name
(Series and Phase) Fill material on top of Reyes Clay, 0-1% slopes

Taxonomy (Subgroup): Sulfic Fluvaquent

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10 YR 3/2	---	none	clay loam
12-	A	5 YR 5/1	10 YR 4/6	few/distinct	clay

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Suffidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
X	Gleyed or Low-Chroma colors		Other (Explain in Remarks

Remarks:
Evidence of disturbance/disking in upper fill layer.

WETLAND DETERMINATION

	(Circle)		(Circle)
Hydrophytic Vegetation Present?	(Yes) No		
Wetland Hydrology Present?	(Yes) No		
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland?	(Yes) No

Remarks:
Low point in fill material surface; depressional wetland, close to clay soil layer; seasonally flooded

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
2A

Project/Site: Bair Island
Applicant/Owner: San Francisco Bay Wildlife Society
Investigator: J. Bourgeois, P. Boursier

Date: April 27, 2000
County: San Mateo
State: California

Do Normal Circumstances exist on the site? Yes (No)

Is the site significantly disturbed (Atypical Situations?) Yes (No)

Is the area a potential Problem Area? Yes (No)

(If needed, explain on reverse.)

Community ID: Seasonal Wetland

Transect ID : 2

Plot ID: A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Polypogon monspeliensis*	H	FACW+	9.		
2. *Frankenia salina*	H	FACW+	10.		
3. *Salicornia virginica*	H	OBL	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

Recorded Data (describe in Remarks):

___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
X No Recorded Data Available

Field Observation:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: 16 (in.)

Depth to Saturated Soil 10 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

___ Inundated
___ Saturated
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

X Oxidized Root Channels in Upper 12 in.
___ Water-Stained Leaves
___ Local Soil Survey Data
x FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks:

SOILS

Sample Number
2A

Map Unit Name
(Series and Phase) Fill material on top of Reyes Clay, 0-1% slopes

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes (No)

Taxonomy (Subgroup): Sulfic Fluvaquent

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-12	A	10 YR 3/2	10 YR 4/6	many/distinct	clay loam
12-	A	5 YR 5/1	10 YR 4/6	few/distinct	clay

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Suffidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
x	Gleyed or Low-Chroma colors		Other (Explain in Remarks

Remarks:

WETLAND DETERMINATION

(Circle)

Hydrophytic Vegetation Present? (Yes) No
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)

Is this Sampling Point Within a Wetland? (Yes) No

Remarks:
Low point in fill material surface; depressional wetland, close to clay soil layer; seasonally flooded.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
2B

Project/Site: Bair Island
Applicant/Owner: San Francisco Bay Wildlife Society
Investigator: J. Bourgeois

Date: April 27, 2000
County: San Mateo
State: California

Do Normal Circumstances exist on the site? Yes (No)

Is the site significantly disturbed (Atypical Situations?) Yes (No)

Is the area a potential Problem Area? Yes (No)

(If needed, explain on reverse.)

Community ID: Tidal Saltmarsh

Transect ID : 2

Plot ID: B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salicornia virginica*	H	OBL	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

Recorded Data (describe in Remarks):

_____ Stream, Lake, or Tide Gauge
_____ Aerial Photographs
_____ Other
x No Recorded Data Available

Field Observation:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: 6 (in.)

Depth to Saturated Soil 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

_____ Inundated
X Saturated
_____ Water Marks
_____ Drift Lines
_____ Sediment Deposits
_____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

_____ Oxidized Root Channels in Upper 12 in.
_____ Water-Stained Leaves
_____ Local Soil Survey Data
_____ FAC-Neutral Test
_____ Other (Explain in Remarks)

Remarks: Flooded in higher high tides.

SOILS

Sample Number
2B

Map Unit Name
(Series and Phase) Reyes Clay, 0-1% slopes

Taxonomy (Subgroup): Sulfic Fluvaquent

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8	A1	10 YR 3/2	---	none	clay loam
8-	A2	5 YR 5/1	---	none	clay

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Suffidic Odor		Organic Streaking in Sandy Soils
x	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
x	Gleyed or Low-Chroma colors		Other (Explain in Remarks

Remarks:

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	(Yes) No	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:
Tidal saltmarsh.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
3A

Project/Site: Bair Island
Applicant/Owner: San Francisco Bay Wildlife Society
Investigator: J. Bourgeois

Date: April 27, 2000
County: San Mateo
State: California

Do Normal Circumstances exist on the site? Yes (No)

Is the site significantly disturbed (Atypical Situations?) Yes (No)

Is the area a potential Problem Area? Yes (No)

(If needed, explain on reverse.)

Community ID: Diked Saltmarsh

Transect ID : 3

Plot ID: A

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salicornia virginica*	H	OBL	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

Recorded Data (describe in Remarks):

_____ Stream, Lake, or Tide Gauge
_____ Aerial Photographs
_____ Other
x No Recorded Data Available

Field Observation:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: 6 (in.)

Depth to Saturated Soil 0 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

_____ Inundated
x Saturated
_____ Water Marks
_____ Drift Lines
_____ Sediment Deposits
_____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

_____ Oxidized Root Channels in Upper 12 in.
_____ Water-Stained Leaves
_____ Local Soil Survey Data
_____ FAC-Neutral Test
_____ Other (Explain in Remarks)

Remarks:

SOILS

Sample Number
3A

Map Unit Name
(Series and Phase) Reyes Clay, 0-1% slopes

Taxonomy (Subgroup): Sulfic Fluvaquent

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8	A1	10 YR 3/2	---	none	clay loam
8-	A2	5 YR 5/1	---	none	clay

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Suffidic Odor		Organic Streaking in Sandy Soils
x	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
x	Gleyed or Low-Chroma colors		Other (Explain in Remarks

Remarks:

WETLAND DETERMINATION

	(Circle)	
Hydrophytic Vegetation Present?	(Yes) No	(Circle)
Wetland Hydrology Present?	(Yes) No	
Hydric Soils Present?	(Yes) No	Is this Sampling Point Within a Wetland? (Yes) No

Remarks:
Diked saltmash, degraded; dominated by pickleweed of low to moderate health.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
3B

Project/Site: Bair Island
Applicant/Owner: San Francisco Bay Wildlife Society
Investigator: J. Bourgeois

Date: April 27, 2000
County: San Mateo
State: California

Do Normal Circumstances exist on the site? Yes (No)

Is the site significantly disturbed (Atypical Situations?) Yes (No)

Is the area a potential Problem Area? Yes (No)

(If needed, explain on reverse.)

Community ID: Ruderal Upland

Transect ID : 3

Plot ID: B

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Lolium multiflorum*	H	FAC	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Large mono-typic stand of Italian ryegrass, some wild radish in area too.

HYDROLOGY

Recorded Data (describe in Remarks):

___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
x No Recorded Data Available

Field Observation:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: >16 (in.)

Depth to Saturated Soil >16 (in.)

Wetland Hydrology Indicators:

Primary Indicators:

___ Inundated
___ Saturated
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

___ Oxidized Root Channels in Upper 12 in.
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Remarks: No hydrologic indicators observed.

SOILS

Sample Number
3B

Map Unit Name
(Series and Phase) Fill material on top of Reyes Clay, 0-1% slopes

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes (No)

Taxonomy (Subgroup): Sulfic Fluvaquent

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-	A	7.5 YR 3/4	---	none	clay loam

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Suffidic Odor		Organic Streaking in Sandy Soils
	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
	Gleyed or Low-Chroma colors		Other (Explain in Remarks

Remarks:
Hard, dry material.

WETLAND DETERMINATION

	(Circle)
Hydrophytic Vegetation Present?	(Yes) No
Wetland Hydrology Present?	Yes (No)
Hydric Soils Present?	Yes (No)

(Circle)

Is this Sampling Point Within a Wetland? Yes (No)

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Sample Number
3C

Project/Site: Bair Island
Applicant/Owner: San Francisco Bay Wildlife Society
Investigator: J. Bourgeois

Date: April 27, 2000
County: San Mateo
State: California

Do Normal Circumstances exist on the site? Yes (No)

Is the site significantly disturbed (Atypical Situations?) Yes (No)

Is the area a potential Problem Area? Yes (No)

(If needed, explain on reverse.)

Community ID: Tidal Saltmarsh

Transect ID : 3

Plot ID: C

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. *Salicornia virginica*	H	OBL	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

Recorded Data (describe in Remarks):

___ Stream, Lake, or Tide Gauge
___ Aerial Photographs
___ Other
x No Recorded Data Available

Field Observation:

Depth of Surface Water: --- (in.)

Depth to Free Water in Pit: 6 (in.)

Depth to Saturated Soil 0 (in.)

Remarks: Frequently inundated.

Wetland Hydrology Indicators:

Primary Indicators:

___ Inundated
x Saturated
___ Water Marks
___ Drift Lines
___ Sediment Deposits
___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

___ Oxidized Root Channels in Upper 12 in.
___ Water-Stained Leaves
___ Local Soil Survey Data
___ FAC-Neutral Test
___ Other (Explain in Remarks)

Sample Number
3C

SOILS

Map Unit Name
(Series and Phase) Reyes Clay, 0-1% slopes

Taxonomy (Subgroup): Sulfic Fluvaquent

Drainage Class:
Field Observations:
Confirm Mapped Type? Yes (No)

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-8	A1	10 YR 3/2	---	none	clay loam
8-	A2	5 YR 5/1	---	none	clay

Hydric Soil Indicators:

	Histosol		Concretions
	Histic Epipedon		High Organic Content in Surface Layer in Sandy Soils
	Suffidic Odor		Organic Streaking in Sandy Soils
x	Aquic Moisture Regime		Listed on Local Hydric Soils List
	Reducing Conditions		Listed on National Hydric Soils List
x	Gleyed or Low-Chroma colors		Other (Explain in Remarks

Remarks:

WETLAND DETERMINATION

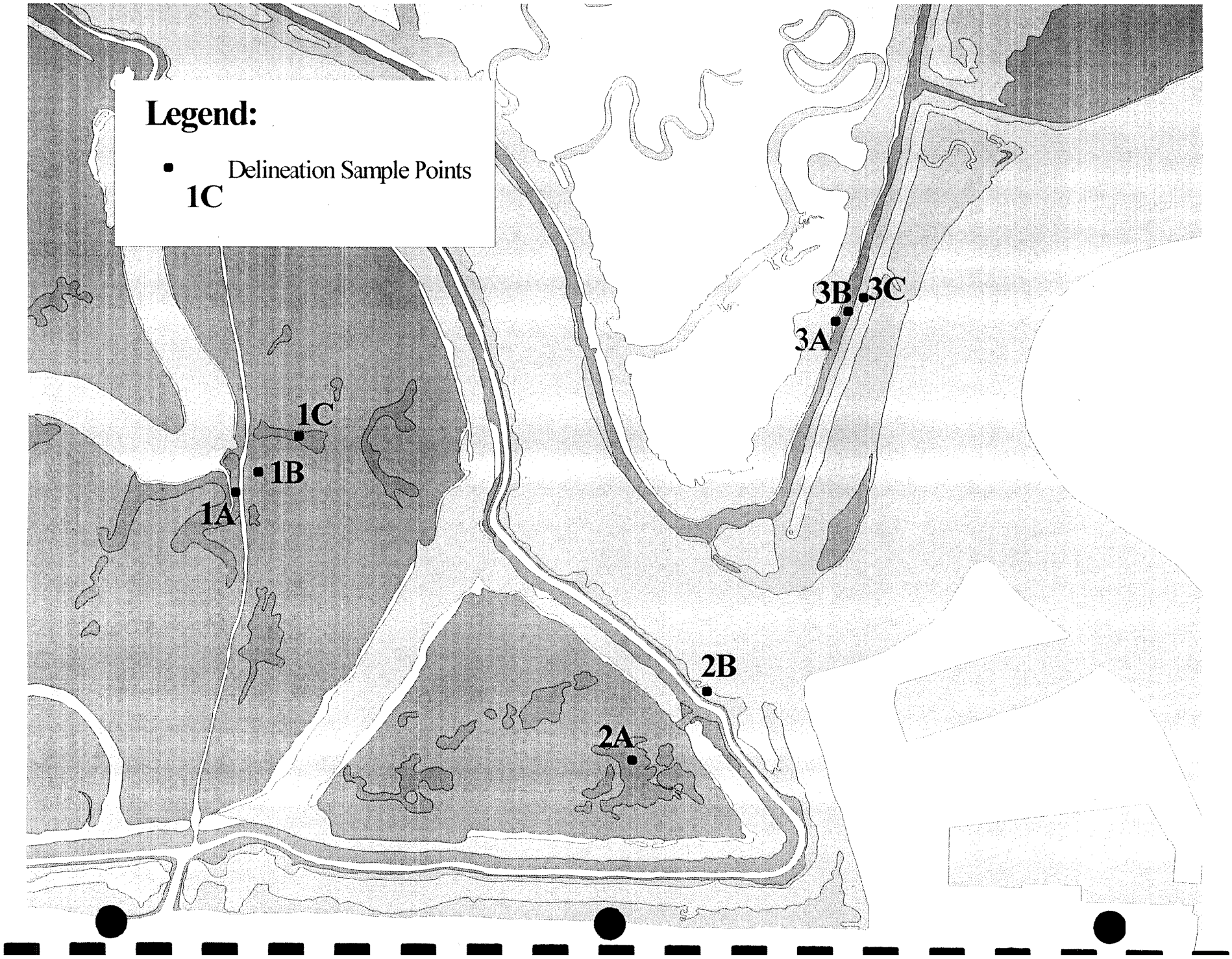
(Circle)

Hydrophytic Vegetation Present? (Yes) No
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

(Circle)

Is this Sampling Point Within a Wetland? (Yes) No

Remarks:
Tidal saltmarsh.


Legend:
Delineation Sample Points
1C
3B
3C
3A
1C
1B
1A
2B
2A

Appendix C.
Color Photographs

A: Degraded diked salt marsh in former salt pond A11.

B: Canada Goose on outboard tidal marsh.

H.T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Bair Island Existing Biological Conditions: Appendix C

File No. **1697-01**	Date **6/30/00**	Figure **C-1**

C: Salt marsh dodder.

D: Harbor seals hauled out on Corkscrew Slough.