

THE NATURAL AREAS OF THE UNIVERSITY OF CALIFORNIA

RICHMOND FIELD STATION

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SEEHRL Report
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THE NATURAL AREAS OF THE UC RICHMOND FIELD STATION

1) Setting.

Since 1950, the University of California, Berkeley has maintained a research facility in the City of Richmond, 7 miles from its Berkeley campus (figure 1). The 160 acre Richmond Field Station (RFS) is located on the eastern edge of San Francisco Bay and includes two major kinds of natural areas. Found offshore are approximately 60 acres of intertidal habitats which consist of approximately 30 acres of salt marsh, 20 acres of mudflats, and 10 acres of open bay water (figure 2). Approximately another 30 acres of the field station consists of grasslands, a portion of which is native coastal prairie (figure 3). There is some indication of the presence of seasonal wetlands on the area adjacent to the coastal prairie.

2) History

The area which is now the Richmond Field Station was once part of the far larger Rancho San Pablo which extended over much of western Contra Costa County. In the early part of this century during the period of industrial growth in Richmond, the California Cap Company became owners of a portion of what was to become University property. Off shore bay waters were included in this ownership. Parts of the bay immediately adjacent to shore were filled in by the California Cap Company. At the bay edge of the property line, two breakwaters were built most probably by the California Cap Company for the purpose of starting the process of filling in the bay. Latter plans included filling in these wetlands and building a road out to the projected shoreline. These plans never came to fruition and by 1946 it was too late for economic feasibility of such a plan. During World War II, munitions were manufactured on the site and many of the wartime structures were built. The wartime industrial expansion which occurred in the City of Richmond did not continue into the post-war period and by the end of the forties, The California Cap Company was ready to sell. The date of purchase by the University of California was October 23, 1950. The original purpose of the acquisition was for a research facility for the College of Engineering. Later on parts of other departments were housed at the field station.

Not all of the Richmond Field Station was once the California Cap Company. Portions were part of the unincorporated town of Stege; others were separately owned lots. These areas were purchased by the University in separate acquisitions

after 1950. Many of these lots were never built on although unpaved roads were in existence and can be seen on aerial photographs. No doubt the extant of coastal prairie that persisted is due to the lack of development on these sites.

After the University took over the property for the College of Engineering, further changes occurred. The University also had plans to fill in the salt marsh but by the early 60's had only filled approximately 2 acres along and immediately off shore (figure 2). The most drastic change which occurred in the marsh was the building of the railway embankment in 1959 which cut off an inner portion of the marsh (approximately 9 acres) from the remaining marsh. Only a bridge over the slough allowed for tidal flow. The construction of the rail line was the result of a 1943 easement granted to the Santa Fe Railroad Company by the California Cap Company. The University upon its purchase of the Richmond Field Station took over the easement agreement. This rail line connected the post office on Pt. Isabel to Marina Bay and was in use until the early 1980's. The rail line has been partially torn up and is used only for occasional foot traffic. Its projected use is as part of a trail around the Bay. Just within 100 feet from the east slope of the rail embankment is a large parallel elevated area of fill. Possibly this was dumped into the salt marsh by Santa Fe during construction of the rail embankment.

Another change made in the marsh was the demolition of a section of an old pier. The pier has been in existence from at least 1899 (CGS maps) and originally extended from the shore to the slough. In its earlier history it was used for the unloading of barges to a narrow gauge rail line which terminated at the pier. The inner marsh portion of the pier was demolished by the University in 1976 and replaced with a road. The road had then to be moved to its present location because its construction violated BCDC regulations. SEEHRL uses the pier and a small pumping station at its end for the pipeline which transports baywater from an offshore platform to SEEHRL. The pier is in a bad state of disrepair and closed to all traffic.

3) RFS Natural Areas

a) Intertidal.

The UCB intertidal habitat is part of the intertidal ecosystem found discontinuously along central San Francisco Bay. While it is likely that extensive wetlands were once characteristic of the eastern shoreline of central San Francisco Bay, the present salt marsh along this portion of the Richmond shoreline could be either a natural remnant or the result of the gradual filling in of bay waters behind breakwaters (figure 2). A breakwater facilitates a natural process of silt deposition

behind it due to decreased tidal and wave action. Over time salt marsh vegetation colonizes and spreads. Tidal action into the marsh comes via a slough which curves around and branches into numerous channels. Two sources of freshwater to the marsh are due to a creek and a drainage channel. Surfacing from underground, Protrero Creek meanders for a short distance along side of Marina Bay. It is thought to drain portions of central Richmond. The drainage channel collects runoff from Freeway 580 and Carlson Blvd. Consequently the composition of the runoff from these two sources differs. The channel merges with the creek just at the terminus of the slough. At this point salt marsh vegetation is mixed with *Scirpus* species, but upstream only freshwater plants occur. This ecotone indicates the limit of usual tidal inundation. Located on the southern side of the salt marsh are mudflats which are exposed at low tide. A breakwater with a small sandy beach on it forms the outer limit of the salt marsh. Ongoing surveys indicate that these are viable habitats.

The RFS salt marsh appears to be similar to other salt marshes found along the margins of San Francisco Bay. There is extensive plant cover with *Spartina foliosa*, *Salicornia pacifica*, and *Distichlis spicata* predominating (table 1). *Grindelia humilis*, an endemic, is found interspersed. Both broad bands of zonation occur as well as areas of intermixing. The lack of more complete zonation in the marsh is probably related to the numerous small channels which transverse it. In addition, past filling activities have made for variable elevations within the same general area which alter tidal flow patterns. These variations in elevation are reflected in the distribution and relative abundance of plant species found within subareas of the marsh. For example the area of landfill within the inner marsh adjacent to the rail embankment is covered with salt grass, coyote bush, and some pampas grass. Pickleweed dominates the surrounding depressed areas. In addition to the flora typical of wetlands, many of the common introduced plants of the East Bay such as fennel, mustard, and poison oak occur on elevated parts of the marsh.

Pickleweed
Chenopodium
salt grass

The faunal resources of the marsh are well represented. The invertebrate species assemblage appears typical of San Francisco Bay mudflat and intertidal habitats (table 2). Ongoing observations suggest that the RFS salt marsh provides adequate cover and food for many vertebrate organisms. The shorebird populations are particularly well represented reflecting the rich invertebrate layer. Approximately 100 bird species of which 20 are shorebirds utilize the marsh and surrounding areas (tables 3a-d). Numerous species nest on the field station. Mammal and herpe species observed in the marsh or in the nearby grasslands are typical of East Bay species which characterize these habitats (tables 4 and 5). Lacking eelgrass, this salt marsh probably does not provide subtidal nurseries for estuarine fish and invertebrates, however many juvenile fish species probably

are found in it. In particular, young pacific staghorn sculpin have frequently been observed in the slough and channels. As many as four endangered species could inhabit the salt marsh: Clapper rail (*Rallus longirostris*), the salt marsh harvest mouse (*Rheithrontomys raviventris raviventris*), California least tern (*Sterna antellarum*), and the California brown pelican (*Pelecanus occidentalis*). In addition the California black rail (*Laterallus jamaicensis*), a threatened species, utilizes salt marsh habitat. A California least tern was observed in May of this year and a clapper rail was sighted in nearby Hoffman marsh in 1984 (Environmental Sciences Senior Seminar, 1984). Given the small size and slight geographic separation from adjacent marshes in the south shoreline, many species most likely move back and forth between marshes. To such organisms, one continuous marsh and mudflat exists along the south Richmond shore from Hoffman marsh to the RFS marsh. Whether a continuous habitat or pockets of isolated marsh occur can make a great difference to species such as the salt marsh harvest mouse which inhabits pickleweed.

b) Grasslands

On the RFS property is located a grassland area of approximately 30 acres which consists of coastal prairie and modified grassland (figure 3). This area supports a remnant coastal prairie of 8.5 acres dominated by native bunch grasses (table 6) and associated native fauna (see previous tables). The distribution of the native grasses over this area is affected by local elevational and moisture changes. The coastal prairie habitat is a valuable reminder of what much of the East Bay was once like. Other portions of the grassland have been modified, but some of the native grasses are found intermixed with the invaders. On the filled area immediately adjacent to the salt marsh, native and nonnative grasses are interspersed with coyote bush and occasional eucalyptus trees. The grasslands provide habitat for at least 8 mammalian species, 5 reptiles, 2 amphibians, and many birds some of which nest there. Within the coastal prairie is a small vernal pool which supports native grasses and forbs different from the surrounding species.

Ecotone

An important characteristic of the RFS salt marsh habitat is its connection to the upland habitat. Back and forth utilization by a variety of species is usual for this natural area. This is particularly well illustrated by vertebrate species. Among the birds, both raptors and songbirds which nest in trees above the marsh forage in the marsh. The black-shouldered kite pair hunts over the marsh but nests and perches in upland eucalyptus trees. Mice from the salt marsh have been taken by these birds. Preliminary trapping in the salt marsh have indicated that rodent species (e.g. *Microtis*

californicus and *Mus musculus*) found in the grasslands of the field station extend into the marsh. The carnivores especially foxes have been observed in both habitats. Herpetile species, with the exception of hylids, have been found in the grasslands immediately adjacent to the marsh and then further back on the field station grasslands. In addition to wetlands and grassland habitats, the ecologic mosaic of the Richmond Field Station is made more complex by the two eucalyptus groves. Raptor species (e.g. kite, red-tailed hawk, and great horned owl) utilize these trees for nesting and perching. Secondly, every autumn, one of the eucalyptus groves is used as a resting site for a population of migrating monarch butterflies. In the past as many as 5000 were observed.

4) Anthropogenic Influences

The south Richmond shoreline has been impacted by human activity. Many of the original tidelands have been drained, dredged or filled. Industrial and commercial activity has included a neighboring chemical plant, lead paint and battery dumps in nearby waters, and a superfund site (figure 4). Some of these sites have been successfully cleaned up; others are being monitored. Other effects of land use are urban runoff from freshwater sources into the marsh, increased residential and recreational areas at Marina Bay, and the conversion of the Santa Fe rail into a bike - hike trail linking Pt. Isabel with Miller-Knox Regional Park. Thus the RFS marsh is an urban marsh; nonetheless its quite viable and extensive flora and fauna attest to the resiliency of the habitat in the face of degradation.

Two categories of disturbances have impinged on the RFS salt marsh: a) physical alterations of the landscape and b) chemical contamination.

a) Physical Alterations.

Physical alterations of the landscape have occurred within the marsh. Parts of the marsh have been filled by both the University and Santa Fe (see history section). Landfill has had the effect of decreasing habitat and changing tidal circulation patterns. The single largest physical change to the marsh has been the construction of the railroad embankment which isolated a section of the marsh to all tidal circulation except that of the slough. This construction may have become a barrier to the movement of organisms within the marsh.

Not only have changes of the landscape occurred within the marsh, but physical alterations to surrounding environs have had impacts on the marsh. The major change has been the recent and ongoing construction of Marina Bay development on the northeast border of the marsh. Housing for approximately 3000 units plus

streets, parks, and open space have been designed into the area which once supported part of the Kaiser shipyards. Separated only by the slough, the upheaval of the landscape has led to changes in sedimentation loadings into the marsh as well as chemical composition of the runoff. Although the magnitude of these changes have not been documented, it would be naive to assume that such large scale development and ongoing construction would have no effect on existing flora and fauna.

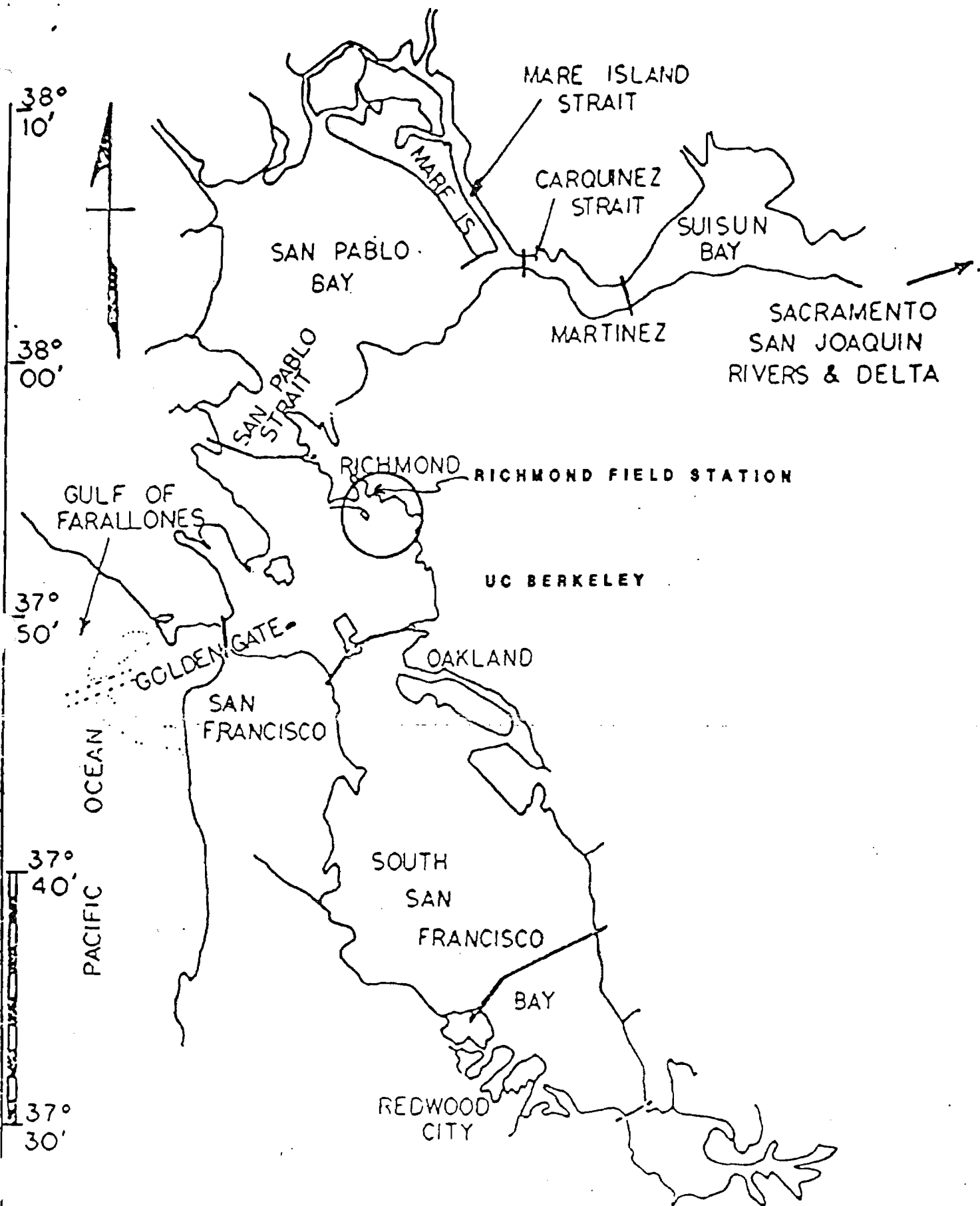
Construction changes are also underway on the southwest border of the Richmond Field Station. Parts of the former Stauffer Chemical Plant are being dismantled by the new owners, ICI. The runoff from this area of construction joins that of the RFS and empties directly into the inner marsh via a drainage pipe. As the construction changes projected over the next years for the RFS occur, an impact on the salt marsh is also likely from within the station. In this case, however, sedimentation loadings and runoff composition can be monitored.

b) Chemical Contamination

Sources of toxicity are both from within and outside of the Richmond Station. Toxicity is primarily an event from the past, but certain forms of contamination continue or have not been completely cleaned up. Contamination sources from within the RFS have been mostly linked to residue from the California Cap Company, a former munitions plant which once had a mercury fulminate plant located on site not far from the salt marsh. Not surprising, mercury levels were highest at the plant site. The dual drainage system from Stauffer, now ICI, and the Richmond Field Station emptying into the marsh was and remains a large source of polluted runoff. The chemical composition of the marsh has been studied in the past (Murray and Horne, 1979). It was found that the area closest to the drainage pipe bringing Stauffer-RFS runoff into the marsh was the most acidic, and it was thought that this was most likely due to the sulphur mounds stored on the chemical plant property. Not only was the innermost part of the marsh the most acidic, but it also supported little vegetation for many years. Recently it appears that the size of the pools of open water has been shrinking with the spread of pickleweed and salt grass. An additional site of toxicity within the marsh is a small impoundment below the railroad embankment on the southern side of the property. This site might have been used as a toxic dump site at some unknown time perhaps by Stauffer. Very little has grown in the pond over the past 6-7 years. Only a slight amount of *Spartina foliosa* and *Distichlis spicata* have spread where the rate of expansion should have been much faster. In addition the hillside above this pond is and has been quite bare. Since the Stauffer Chemical plant has been replaced by ICI, a pesticide and herbicide manufacturing plant, the runoff into the marsh will be in the future different.

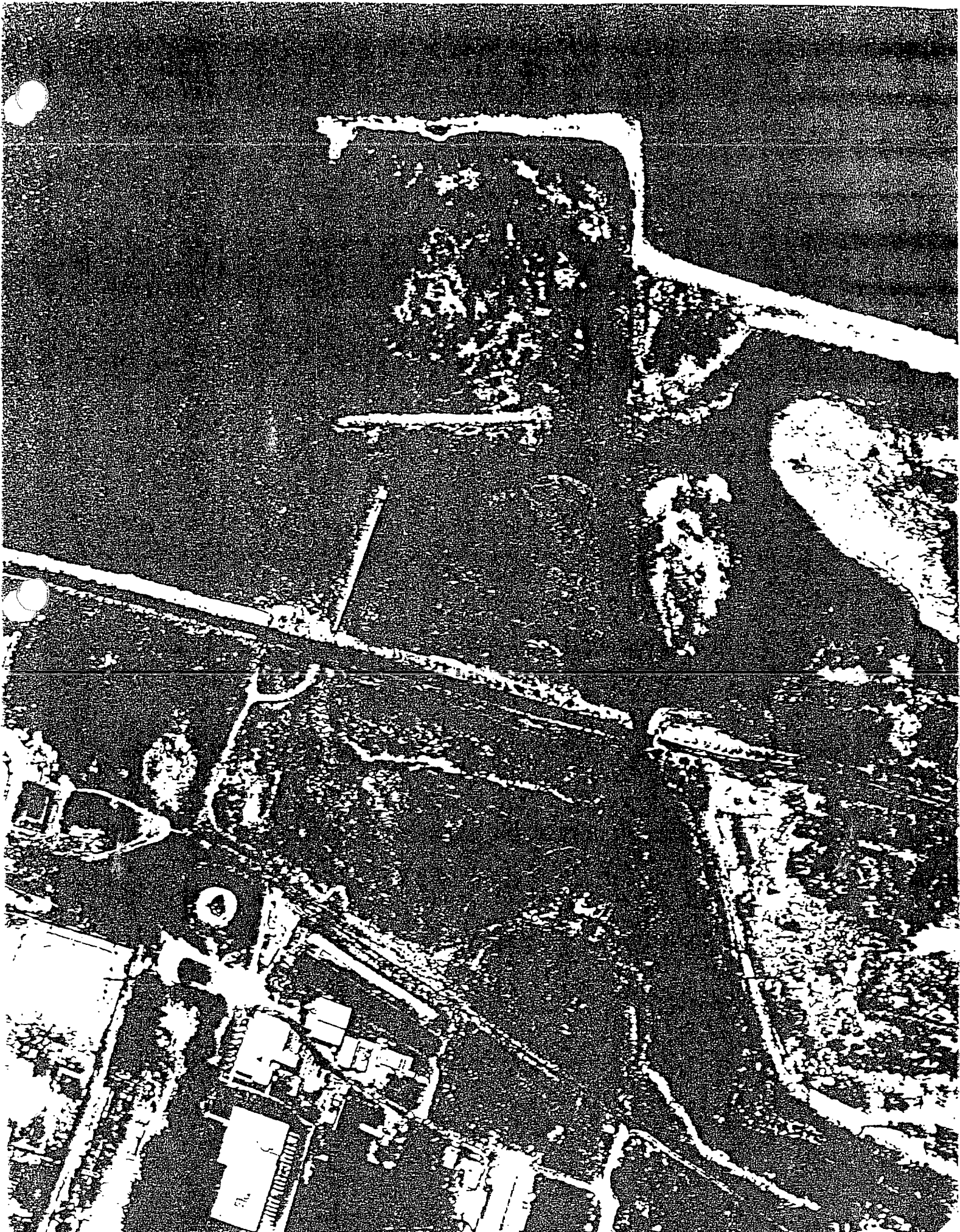
Other sources of contamination to the intertidal area from within the south shoreline of Richmond include effects from the dredging of the Richmond Inner Harbor where high levels of DDT have been recorded. Secondly for many years lead batteries were dumped into bay waters off Pt Isabel. A cleanup by the Santa Fe Company which owns the site has been considered successful by the State Regional Water Quality Control Board. Another contaminated site considered successfully cleaned up by BCDC (p.c.) is Meeker Ditch immediately bordering the northeastern side of the UC salt marsh. This area was used as a lead paint dump for many years. Part of mitigation proceedings for Marina Bay was to clean up this site, plant additional salt marsh vegetation, and create a small wetlands island within the slough. Although not in bay waters but rather nearby on the shore, a superfund site leaking heavy metals into groundwater has not yet been adequately cleaned up. This site known as the liquid gold site may or may not be affecting the RFS intertidal area.

Although probably once extending over the entire field station, the coastal prairie has escaped total destruction because some of the acreage on which it is located was not part of the California Cap Company. Nor was it developed as private lots prior to 1950. After University acquisition, these grasslands for the most part were left undisturbed except for yearly mowing. Past University modification of the coastal prairie which did occur was in part due to ignorance about its ecological value and negligence to ongoing research. Threats to the native grasslands are now from within the Richmond Field Station. Unless plans for the redesign of the field station include protection for these grasslands, they will disappear.



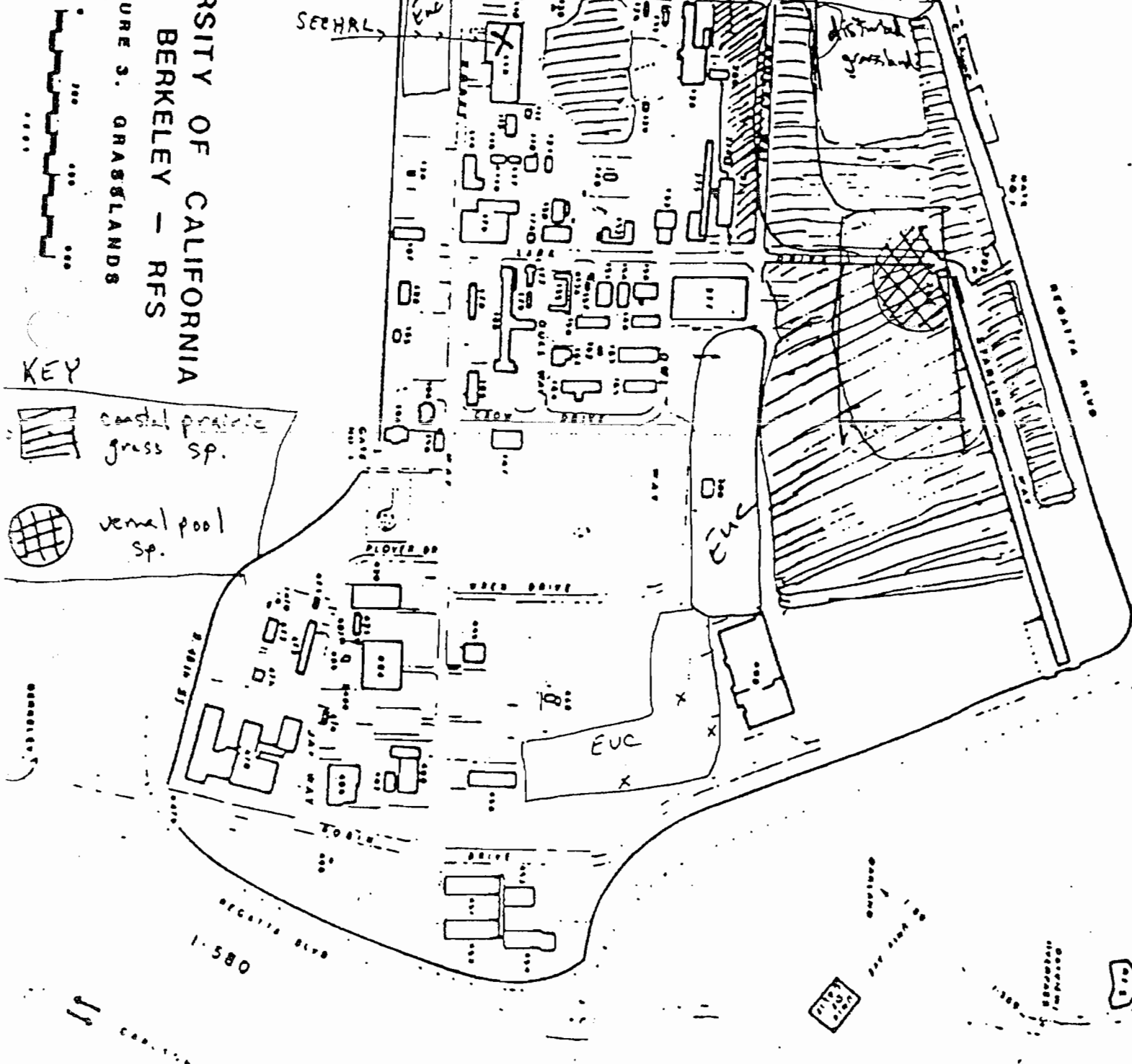
SAN FRANCISCO BAY AND ESTUARY

Figure



UNIVERSITY OF CALIFORNIA AT BERKELEY - RFS

FIGURE 3. GRASSLANDS



KEY



-  coastal prairie grass sp.
-  vernal pool sp.

Table 1. Preliminary Plant List for RFS Salt Marsh

(Identifications by Barbara Ertter, UC Herbarium,
Jan. 1989)

Salicornia pacifica - pickleweed
Spartina foliosa Trin. - cord grass
Distichlis spicata (L.) Greene - salt grass
Cortaderia selloana (Schult.) Asch. & Graebn. - pampas grass
Scirpus sp. - bulrush

Limonium californicum (Boiss.) Heller - marsh rosemary
Sonchus sp. - dandelion
Vicia sp. - vetch
Phacelia californica Cham.
Lupinus sp. - lupine

Artemisia californica Less. - sagebrush
Grindelia humilis H&A - gum plant
Baccharis pilularis D.C. ssp. *consanguinea* (D.C.) - coyote bush
Heteromeles arbutifolia M. Roem. - toyon
Cytisus monspiculanus L. - french broom
Salix lasialepis - willow
Rhus diversiloba - poison oak

Polystichum munitum - fern
Polypodium californicum Kauf., Sens. Lat. - fern
Eriophyllum staechadifolium Lag.
Spergularia marina (L.) Griseb.
Gnaphalium sp.
Flaroparmelia caperata (L.) Hale - lichen
Serophularia (?)

Table 2. Dominant MacroINVERTEBRATES, Richmond Field Station
Identified by Michael Fawcett, Research Ecologist,
SEEHRL, (May, 1989)

Mytilus edulis - bay mussel (N)
Ischadium demissum - ribbed horse mussel
Macoma balthica - clam
Mya arenaria - soft shell clam
Gemma gemma - clam
Tapes japonica - Japanese littleneck clam
Protothaca staminea - littleneck clam (N)
Macoma nasuta - bent nose clam (N)
Urosalpinx cinerea - Atlantic oysterdrill
Busycotypus canaliculatus - channeled whelk
Ostrea lurida - native oyster (N)
Ilyanassa obsoleta - mud snail
Littorina scutulata - periwinkle (N)

Hemigrapsus oregonensis - yellow shore crab (N)
Hemigrapsus nudus - purple shore crab (N)
Pachygrapsus crassipes - lined shore crab (N)
Cancer magister - dungeness crab (N)
Cancer antennarius - rock crab (N)
Cancer gracilis - slender crab (N)
Petrolisthes sp. - porcelain crab (N)
Balanus glandula - acorn barnacle (N)
Balanus improvisus - barnacle
Chthamalus dalli - barnacle (N)
Orchestia traskiana - beachhopper (N)
Ligia palasii - isopod (N)

Table 3a BIRDS RECORDED AT THE DC RICHMOND FIELD STATION
Based on documented observations, January 1987-April 1989

Loon (species)	Sharp-shinned Hawk
Western Grebe	Red-tailed Hawk
Clark's Grebe	American Kestrel
Brown Pelican	California Quail
White Pelican	Ring-necked Pheasant
Double-crested Cormorant	Rock Dove
Great Blue Heron	Mourning Dove
Great Egret	Red-crowned Parrot
Snowy Egret	Great-horned Owl
Black-crowned Night Heron	Anna's Hummingbird
Green-backed Heron	Allen's Hummingbird
Canada Goose	Belted Kingfisher
Mallard	Northern Flicker
Gadwall	Red-breasted Sapsucker
Green-winged Teal	Williamson's Sapsucker
Cinnamon Teal	Western Wood Pewee
American Wigeon	Black Phoebe
Eurasian Wigeon	Says Phoebe
Ruddy Duck	Willow Flycatcher
Canvasback	Western Flycatcher
Lesser Scaup	Northern Rough-winged Swallow
Greater Scaup	Barn Swallow
Surf Scoter	Scrub Jay
White-winged Scoter	Common Raven
Barrow's Goldeneye	American Crow
Common Goldeneye	Chestnut-backed Chickadee
Bufflehead	Bushtit
Red-breasted Merganser	Ruby-crowned Kinglet
American Coot	Hermit Thrush
Killdeer	American Robin
Black-bellied Plover	Loggerhead Shrike
Semi-palmated Plover	Northern Mockingbird
Long-billed Curlew	Water Pipit
Whimbrel	Cedar Waxwing
Marbled Godwit	European Starling
Willet	Yellow-rumped Warbler
Greater Yellowlegs	Wilson's Warbler
Dowitcher (species)	Common Yellowthroat
Black Turnstone	Brown Towhee
Dunlin	Savannah Sparrow
American Avocet	Song Sparrow
Western Sandpiper	Golden-crowned Sparrow
Least Sandpiper	White-crowned Sparrow
Sanderling	Fox Sparrow
Bonaparte's Gull	Lincoln's Sparrow
California Gull	Dark-eyed Junco
Glaucous-winged Gull	Red-winged Blackbird
Western Gull	Brewer's Blackbird
Forster's Tern	Brown-headed Cowbird
Caspian Tern	Western Meadowlark
Turkey Vulture	House Finch
Osprey	Pine Siskin
Black-shouldered Kite	American Goldfinch
Northern Harrier	Lesser Goldfinch
Cooper's Hawk	House Sparrow

*Includes 'accidentals'

BIRDS RECORDED IN THE SALT MARSH AT THE DC RICHMOND FIELD STATION

Based on documented observations, January 1987-April 1989*

- + Great Blue Heron
 - Great Egret
 - Snowy Egret
 - Black-crowned Night Heron
 - Green-backed Heron
 - Canada Goose
 - + Mallard (n)
 - + Killdeer (n)
 - Semi-Palmated Plover
 - Long-billed Curlew
 - Whimbrel
 - Marbled Godwit
 - Willet
 - Greater Yellowlegs
 - + Turkey Vulture
 - Osprey
 - + Black-shouldered Kite (n)
 - + Northern Harrier
 - + Sharp-shinned Hawk
 - + Red-tailed Hawk (n)
 - + American Kestrel
 - + Rock Dove
 - + Mourning Dove (n)
 - + Great-horned Owl (n)
 - + Anna's Hummingbird
 - Belted Kingfisher
 - + Northern Flicker
 - + Black Phoebe
 - + Say's Phoebe
 - + Western Flycatcher
 - Willow Flycatcher
 - + Northern Rough-winged Swallow
 - + Barn Swallow
 - Common Raven
 - + American Crow
 - + Bushtit (n)
 - + Loggerhead Shrike
 - + Northern Mockingbird
 - + Water Pipit
 - + European Starling (n)
 - + Yellow-rumped Warbler
 - + Common Yellowthroat
 - + Savannah Sparrow
 - + Song Sparrow (n)
 - + Golden-crowned Sparrow
 - + White-crowned Sparrow
 - + Red-winged Blackbird
 - + Western Meadowlark
 - + House Finch
 - + American Goldfinch
 - + Lesser Goldfinch
- + = also recorded in grasslands
n = nests seen at RFS

*NOTE: Since I have had regular access to the salt marsh only since January 1989, all sightings are included.

Table 10 SHOREBIRDS, WATERFOWL, AND SEABIRDS RECORDED AT THE UC RICHMOND FIELD STATION
Based on documented observations, January 1987-April 1989*

Loon (species)
Western Grebe
Clark's Grebe
Brown Pelican
White Pelican
Double-crested Cormorant
Great Blue Heron
Great Egret
Snowy Egret
Black-crowned Night Heron
Green-backed Heron
Canada Goose
Mallard
Gadwall
Green-winged Teal
Cinnamon Teal
American Wigeon
Eurasian Wigeon
Ruddy Duck
Canvasback
Lesser Scaup
Greater Scaup
Surf Scoter
White-winged Scoter
Barrow's Goldeneye
Common Goldeneye
Bufflehead
Red-breasted Merganser
American Coot
Killdeer
Black-bellied Plover
Semi-palmated Plover
Long-billed Curlew
Whimbrel
Marbled Godwit
Willet
Greater Yellowlegs
Dowitcher (species)
Black Turnstone
Dunlin
American Avocet
Western Sandpiper
Least Sandpiper
Sanderling
Bonaparte's Gull
California Gull
Glaucous-winged Gull
Western Gull
Forster's Tern
Caspian Tern
Osprey
Belted Kingfisher

*NOTE: Since I have had regular access to the shoreline only since January 1989, all sightings are included.

Table 2d

BIRDS RECORDED IN THE GRASSLANDS AT THE DC RICHMOND FIELD STATION

Based on documented observations, January 1987-March 1989

Legend: r = resident at RFS; n = nests seen at RFS; + = also recorded in
 Sp = Spring; Su = Summer; F = Fall; W = Winter salt marsh

Species	Sp	Su	F	W
+ Great Blue Heron			X	X
+ Mallard (r) (n)	X	X	X	X
+ Killdeer (r)	X	X	X	X
+ Turkey Vulture (r)	X	X	X	X
+ Black Shouldered Kite (n)	X		X	X
+ Northern Harrier	X	X	X	X
Cooper's Hawk				X
+ Sharp-shinned Hawk				X
+ Red-tailed Hawk (r) (n)	X	X	X	X
+ American Kestrel (r)	X	X	X	X
California Quail	X			X
Ring-necked Pheasant	X			
+ Rock Dove (r)	X	X	X	X
+ Mourning Dove (r) (n)	X	X	X	X
+ Great-horned Owl (r?) (n)	X	X		
+ Anna's Hummingbird (r)	X	X	X	X
Allen's Hummingbird	X	X		
+ Northern Flicker			X	X
+ Black Phoebe (r)	X	X	X	X
+ Say's Phoebe			X	X
+ Western Flycatcher			X	
+ Northern Rough-winged Swallow		X		
+ Barn Swallow	X	X		
+ American Crow (r)	X	X	X	X
+ Bushtit (r) (n)	X	X	X	X
Hermit Thrush	X		X	X
American Robin (r) (n)	X	X	X	X
+ Loggerhead Shrike	X		X	X
+ Northern Mockingbird (r)	X	X	X	X
+ Water Pipit				X
+ European Starling (r) (n)	X	X	X	X
+ Yellow-rumped Warbler			X	X
+ Common Yellowthroat				X
Brown Towhee (r)	X	X	X	X
+ Savannah Sparrow			X	X
+ Song Sparrow (r) (n)	X	X	X	X
+ Golden-crowned Sparrow			X	X
+ White-crowned Sparrow			X	X
Lincoln's Sparrow			X	X
+ Red-winged Blackbird (r)	X	X	X	X
Brewer's Blackbird	X			
Brown-headed Cowbird	X			
+ Western Meadowlark			X	X
+ House Finch (r)	X	X	X	X
+ American Goldfinch	X	X	X	X
+ Lesser Goldfinch			X	
House Sparrow	X	X		

NOTE: Species observed fewer than four times in any year are considered 'accidentals,' and are not included in this list.

Prepared by Kay Loughman, WRLF, 400 RFS, April 13, 1989

Table 4. MAMMALS RECORDED AT UC RICHMOND FIELD STATION
January - May 1989

(Identifications by Joyce Gutstein, SEEHRL, and Wm. Lidicker,
Dept. of Zoology)

Microtis californicus - California vole
Mus musculus - house mouse (I)
Rattus rattus - roof rat (prob. iden.) (I)
Thomomys bottae - valley pocket gopher
Spermophilus beecheyi - California ground squirrel
Lepus californicus - black-tailed jackrabbit

Mephitis mephitis - striped skunk
Procyon lotor - raccoon
Vulpes fulva - red fox (probable identification) (I)
Urocyon cinereoargenteus - gray fox (probable identification)
Mustela frenata - long-tailed weasel (possible sighting)

Didelphis virginiana - Virginia opossum (I)

possibles: As stated by Wm. Lidicker, Dept. of Zoology, UCB

Sorex vagrans halicoetes - vagrant shrew
Scapanus latimanus - broad-footed mole
Rheithrodontomys megalotis - western harvest mouse
Rheithrodontomys raviventris raviventris - salt marsh harvest
mouse (endangered)
Eptesicus fuscus -big-brown bat
Lasiurus cinereus - hoary bat
Myotis californicus
Myotis yumanensis
Myotis volans
Myotis thysanodes
Myotis evotis
Lasionycteris noctivagans
Lasiurus borealis
Plecotus townsendii
Tadarida brasiliensis

Table 5. AMPHIBIANS AND REPTILES RECORDED AT UC RICHMOND FIELD STATION, January - May 1989

(Identifications by Joyce Gutstein, SEEHRL)

Amphibians

Hyla regilla - Pacific treefrog
Batrachoseps attenuatus - slender salamander
Bufo boreas - western toad (probable)

Reptiles

Thamnophis elegans - western terrestrial garter snake
Thamnophis couchi - western aquatic garter snake
Thamnophis sirtalis - common garter snake (probable iden.)
Pituophis melanoleucus - gopher snake
Coluber constrictor - racer

Sceloporus occidentalis - western fence lizard

possibles: As stated by Wm. Lidicker, Dept. of Zoology, UCB

Diadophis punctatus - western ring-necked snake
Elagaria multicarinata - southern alligator lizard
Elagaria coerulea - northern alligator lizard

Table 6. Grasslands Plant Species, Richmond Field Station
(preliminary and mostly grasses) May, 1989
(identifications by J. Bartolome, Dept. of Forestry, UCB)

Coastal Prairie species:

Danthonia californica (N)
Stipa pulchra (N)

Bromus carinatus (N)
Sitanion hystrix (N)
Plantago lanceolata (I)
Vulpia bromoides (I)

Swale area:

Hordeum brachyantherum (N)
Heleocharis sp. (N)
Carex sp. (N)
Juncus sp. (N)
Cyperus sp. (i)
Aster exilis (N)

Disturbed areas:

Avena fatua (I)
Aira caryophylllea (I)
Briza minor (I)
Bromus mollis (I)
Bromus diandrus (I)
Carduus pynoccephalus (I)
Hordeum leporinum(I)

Near areas:

Picris echoides (I)
Sisyrinchium bellum (N)
Dipsacus fullonum (I)
Vicia sativa (I)
Sida hederacea (N)
Hemizonia luzulaefolia (N)
Cortaderia selloana (I)
Phalaris tuberosa (I)
Parapholis incurva (I)
Juncus bufonicus (I)
Distichlis spicata (N)

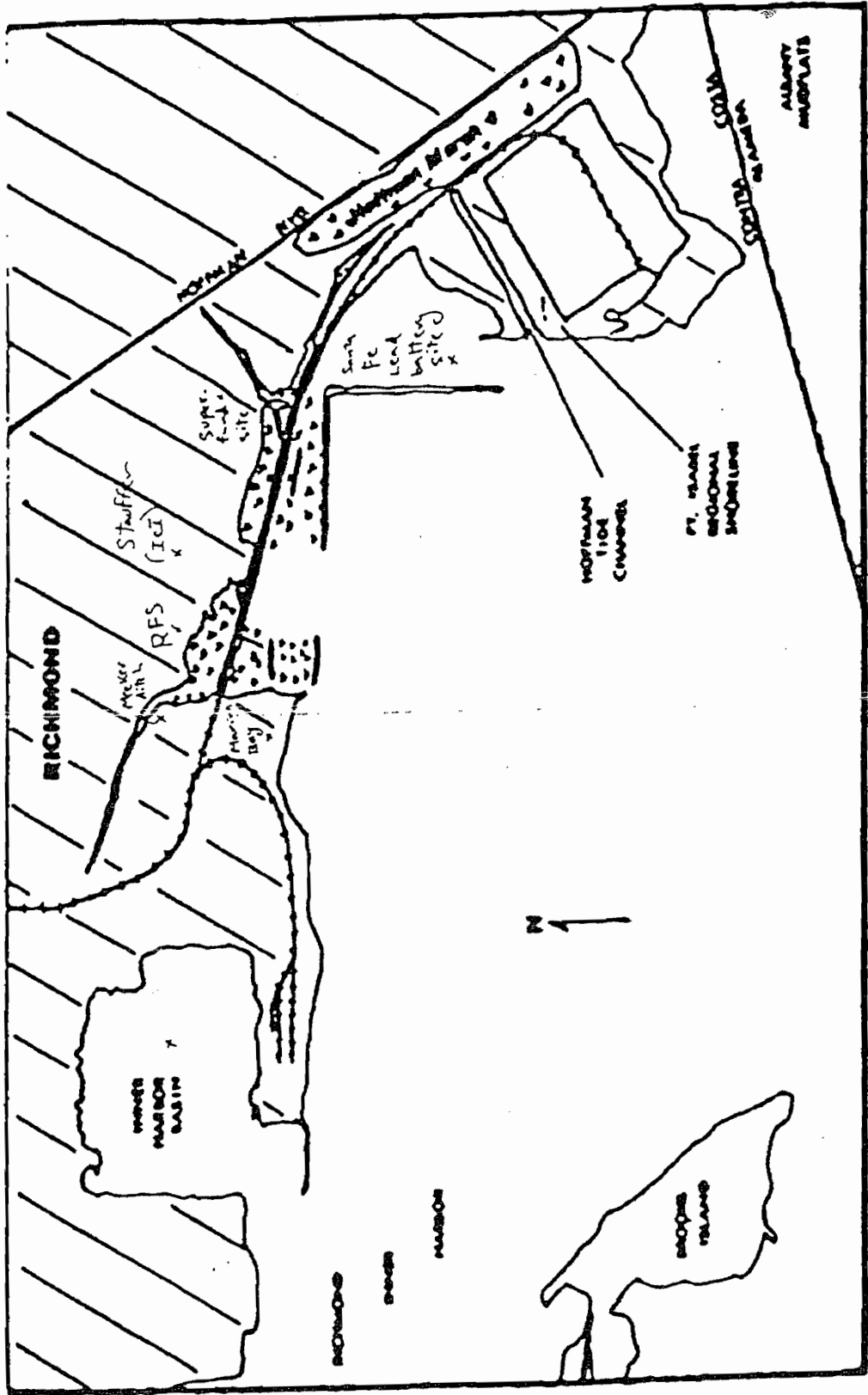


Figure 4. Anthropogenic influenced sites along Richmond's south shoreline.