Chapter 8

DOCUMENTATION OF THE SALT MARSH VEGETATION IN THE SOUTH RICHMOND LOCALE

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Introduction

As human populations grow they spread out on the land and when the readily usable tracts have been built on or farmed, develop ones less suitable for their purposes. Wetlands are not readily usable but have been targeted for development, not only because they can be made useful and profitable by filling, draining, and diking, but also because of the appeal of their coastal surroundings. Beginning in the mid-1800s, wetlands in the San Francisco Bay Area have been filled in; their destruction has only been recognized and addressed as a problem, however, in the past thirty years. Environmentalists became concerned that 90 percent of the wetlands that used to surround San Francisco Bay (the Bay) have been destroyed. As a result, in 1965, the San Francisco Bay Conservation and Development Commission (BCDC) was established to regulate development of the Bay and its resources. By requiring developers to get a permit to carry out their plans, BCDC has been effective in slowing down wetlands destruction and prohibiting unnecessary and undesirable use of the Bay. The United States Army Corps of Engineers (the Corps) also has the duty of preventing wetlands destruction. However, the Corps' policies are broad and have been interpreted loosely.

Owners of wetlands have sought ways to avoid compliance with preservation policies. In some instances developers have altered a wetland without a permit. One example of this is the city of Richmond paving a road over salt marsh and riparian vegetation in the study area of this report without a permit (Nelson, 1987, pers. comm.). In another example, a wetland in Hayward was disked by a developer, so that the vegetation is no longer recognizable as that typical of a wetland. As a result, one might question whether or not this area is, or ever was, a wetland, or whether or not the area should be preserved. Therefore the potential for circumventing rules protecting wetlands is increased. This situation might be avoided if baseline data on wetland location and on the cover by wetland plants in these locations are gathered before development plans are proposed and before permits are applied for.

This report documents the salt marshes, a type of wetland, on the South Richmond shoreline. The salt marshes are large areas of open space which are part of a partially industrialized locale. Current development in the area includes freeway expansion, residential construction, expansion of a University of California field station, and establishment of hiking and biking trails. It is likely that growth in the city of Richmond will pressure developers to use the open spaces such as the salt marshes. A map of the salt marshes in the study area and details about their composition and

characteristics are included in this report. Developers, Richmond city planners, agencies that regulate salt marsh destruction, and citizens groups interested in shoreline issues, as well as the landowners themselves, may find this information useful.

Past Studies

The South Richmond Special Area Plan Advisory Committee (SRSSAPCAC; 1977) mentioned the existence and importance of the salt marshes in the study area in their report, the focus of which was land-use potential. Hall, Goodhue, Haisley, and Barker (1986) published a broad analysis of the factors affecting the natural, physical, and socioeconomic well-being of the entire Richmond shoreline. Oddi (1982) presented an ecological analysis of the salt marshes documenting marsh locations, and listing marsh plants and animals in the southern portion of the study area.

Background

Regulatory forces - A developer must seek permission to alter a wetland at three levels: from the local government, the state government (BCDC), and the federal government (the Corps). The city of Richmond's policies regarding wetlands are to protect mudflats and all tidelands to the maximum extent feasible, and to require mitigation measures to offset any detrimental impact on wetlands (SRSSAPCAC, 1977).

A permit will not be granted by BCDC unless "the public benefits of the project exceed the public detriments, and then only for water-oriented use" (McAteer-Petris Act, 1982). Unless the project is necessary and there are no alternative sites, BCDC does not issue permits for projects that destroy wetlands. When BCDC does issue a permit for development of a wetland, the developer is required to create or restore another wetland area in order to compensate for the destruction. The effectiveness of this procedure, known as mitigation, is controversial.

Marsh creation and restoration techniques are in experimental stages (Josselyn, 1985). Enough time has not elapsed since creation and restoration projects began to determine whether or not they will be successful. Often the criteria for success have not been defined. Frequently these projects have not been monitored after the initial work was done to determine whether or not the objectives were met (Race, 1987, pers. comm.). Yet, mitigation has been written into policy and is being practiced.

It is the Corps' policy "to protect weltands from destruction unless the public interest requires otherwise" (Horwitz, 1978). There are many different types of wetlands, of which the salt marsh is only one, and there is much variety within any one type. Consequently, what constitutes a "wetland" becomes a subject for debate by the parties involved with wetland conservation and development. The Corps defines "wetlands" as : "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Horwitz, 1978).

What frequency and duration of saturation are "sufficient," and what is meant by a "prevalence" of typical plants, or by "normal" circumstances, are not clear. The Corps' definition of wetland must be re-interpreted each time a permit application is considered, making their method of issuing permits inconsistent and arbitrary.

The Corps shares some of its responsibilities with BCDC which has jurisdiction over "Bay waters, Bay lands subject to tidal action including all sloughs and marshlands up to 5 feet above mean sea level, a shoreline band 100 feet inland from the point of highest tidal action, salt ponds, and certain managed wetlands and tributary waterways" (McAteer-Petris Act, 1982). The Corps' jurisdiction encompasses "all waters" of the United States, including wetlands, in which they control dredging and filling (Horwitz, 1978).

Development Interests in the South Richmond Locale

Marina Bay, a condominium complex, the plans for which had to be scaled down because of BCDC restrictions, is being constructed to the west, and a new section of Freeway I-580 is being built to the north of the study area parallel to Hoffman Boulevard (Figure 1; Dickey, 1987). These developments will probably facilitate other development in the near future in this "under-utilized" portion of Richmond.

Richmond's Redevelopment Agency is working with a proposal to establish walking and biking trails parallel to the water (Fong, 1987). The University of California is planning to expand its Richmond Field Station, some of which is marshland in the study area.

The Santa Fe Land Improvement Company, Inc. (Santa Fe) proposed to fill their land and create an industrial park in 1977. The Corps turned down the permit application. Since then, Santa Fe has not proposed any more plans on the South Richmond shoreline, but it has made many plans for most of the East Bay shoreline as far north as Albany. It is likely that Santa Fe will again propose development in the study area.

Methodology

The study area is shown in Figure 1. The salt marshes were mapped on an enlargement of the U.S. Geological Survey Richmond topographic quadrangle, 7.5 minute series. The remaining area was examined for the presence of marsh plants. Sub-regions in which marsh plants existed, but were not predominant, were also noted on the map. The mapping was done between November 1986 and February 1987.

Many of the marshes were not shown on the topographic map and had to be drawn on the base map, which was done by locating places on the ground that are marked on the topographic sheet, and using these marks as reference points from which to draw the marsh areas. There were few marks on the quadrangle that could be located on the ground, so there is a degree of error involved in drawing the marsh areas on the map.

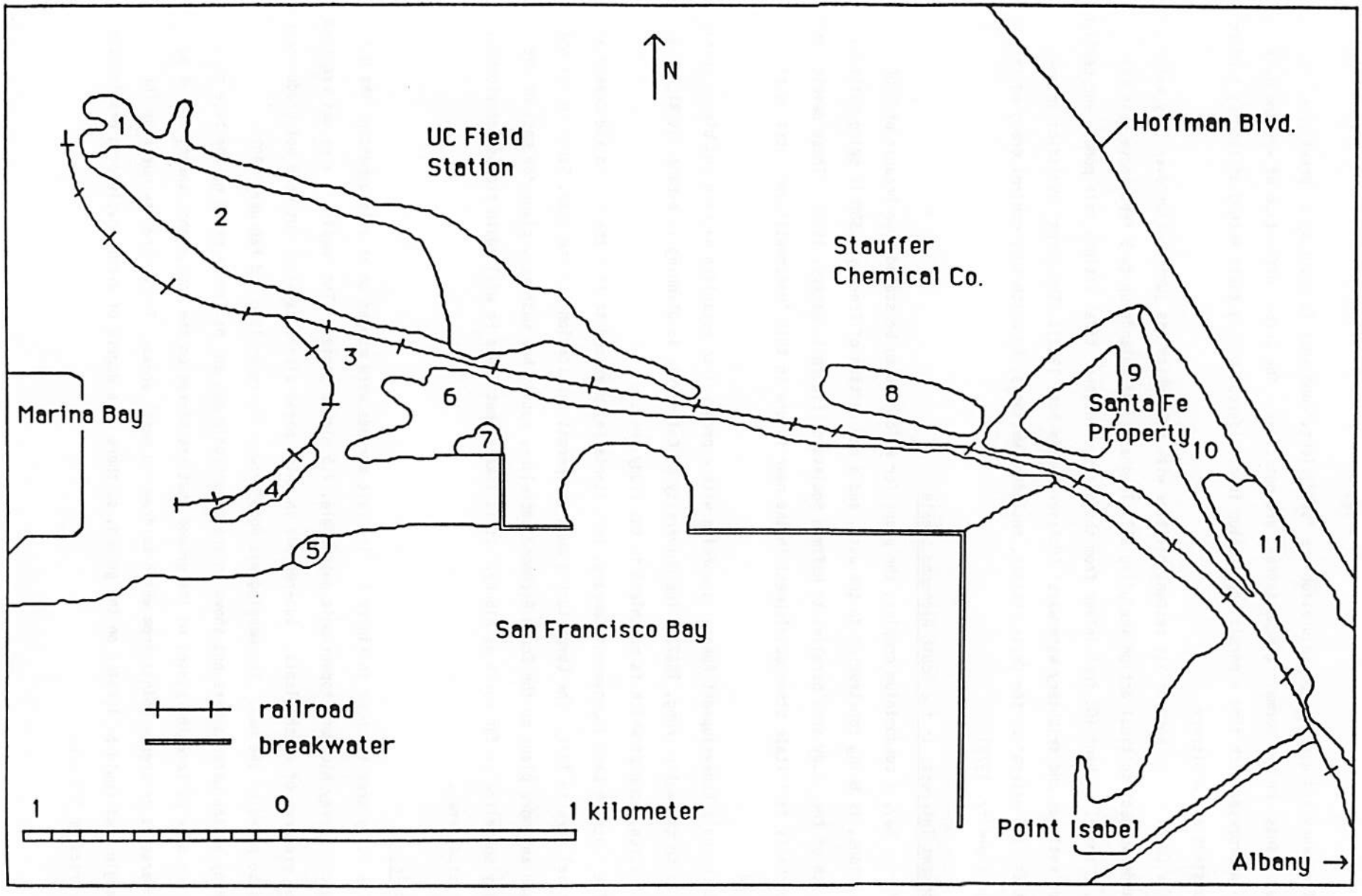

Figure 1. Salt marshes in the study area.
Map based on USGS Topographic Quadrangle (7.5 minute series), [Richmond], 1981.

The area of each of the sub-regions mapped was estimated by assuming that they approximate geometrical figures, and calculating the areas of those figures. Measurements for these calculations were taken three times by pacing the perimeters of the sub-regions. The averages of the three estimates appear in Table 1.

All of the sub-regions that were mapped were then sampled in one of two ways. Twenty-five meter transects were run in areas where salt marsh plants predominated, those plants which touched the transects were counted. In these areas all of the data points represent salt marsh plants; in areas in which non-salt marsh plants predominate, relatively few of the data points collected would have represented salt marsh species had 25-meter transects been run. To show contrast between the numbers of salt marsh and non-salt marsh plants in each of the sub-regions that were not dominated by salt marsh plants, it was necessary to sample by a method that covered a larger area and allowed collection of a larger number of data points than the line transect method. This was accomplished by using the step-point method, which involves walking along a 200 m transect and recording the species directly in front of the toe after every step of the right foot (Fiedler, 1986, pers. comm.). The numbers of individuals of each species along the transects are counted. Percent cover by salt marsh plants, each species of salt marsh plant, non-salt marsh plants, soil, and refuse were calculated.

There are some areas that support so little salt marsh vegetation that the salt marsh species do not show up in the sampling results. These areas were also recorded on the map, and a description of them is given, based on observation rather than sampling.

Results

The percent area covered by salt marsh plants, non-salt marsh plants, soil, and refuse in each area is shown in Table 1. Columns sub-headed by names of individual salt marsh species provide detail about the plant composition. Also included in the table are the size of the sub-region, the date the area was sampled, the method of sampling used, and the percent of each area that was sampled.

As the data themselves do not give a complete picture of the sub-regions, the following is a brief description of the vegetation types and hydrology of each of the sub-regions:

Area 1 is a diked marsh that has two sources of water input: limited tidal influence and stream flow. Only salt marsh plants are found in this sub-region, comprising 13 percent cover. Rubber tires are scattered around the northwest portion of this marsh.

Area 2 supports a variety of vegetation types; salt marsh plants are not prevalent. This sub-region is separated from Bay waters, and there are no streams feeding into it. Plans are being made to regrade and restore to tidal action theeast end of this sub-region as mitigation for the destruction of marsh vegetation by the city of Richmond west of Areas 1 and 2 (Nelson, 1987, pers. comm.).

Area 3 is a plateau-like region of unusually high elevation. The slopes of the plateau are covered with non-salt marsh vegetation, but the sunken top of the plateau supports abundant pickleweed

Area no.	Date Sampled	Sampling Method	Size[4] (acres)	% of Area Sampled	% Cover							
					salt marsh plants					non-salt marsh plants	soil	refuse
					pickleweed	cordgrass	saltgrass	grindelia	total			
1	Jan. 1987	LT[1]	1.04	0.02	3.3	6.3	2.2	1.1	13	0	87	0
2	Jan. 1987	D[2]	5.28	0	not sampled							
3	Feb. 1987	SP[3]	5.47	0.002	32.20	0	37.29	0	69.49	13.56	16.95	0
4	Jan. 1987	SP	0.46	0.12	1.08	1.14	15.05	1.14	26.56	42.59	26.14	5.68
5	Jan. 1987	LT	0.01	0.75	0.15	0	0	0	0.15	0	99.85	0
6	Nov. 1986	SP	61.75	0.002	2.38	1.85	0	0	4.86	0	95	0
7	Dec. 1987	SP	0.11	0.60	1.08	0	29.85	8.21	38.88	53	6.22	1.49
8	not sampled		1.14	0	not sampled							
9	Nov. 1986	LT	24.70	0.007	33.01	52.29	0	2.45	87.75	1.04	11.21	0
10	Nov. 1986	SP	7.41	0.008	31.29	0	5.25	0	36.54	60.28	0.87	2.38
11	Feb. 1987	LT	29.64	0.0006	9.08	0.04	0	0	9.12	0	90	0

Table 1. Sampling information.
Notes: 1. Line Transect; 2. Description; 3. Step-point; 4. Sizes estimated; see text.

and salt grass, which covers 69 percent of the sub-region. The vegetation appears dry compared to the same types of vegetation in other locations. The water source for Area 3 is not clear. The sub-region does not receive tidal action.

Area 4 supports some salt marsh vegetation, but the percent cover by salt marsh plants (27) is less than the percent cover by non-salt marsh plants (43). This sub-region is at an elevation that is too high to be affected by the tides. Area 4 contains a lot of refuse (5.68 percent cover), including trash, tires, wood, and cement.

Cordgrass is the only plant growing in Area 5. With a percent cover of 0.15 by cordgrass and of 99.85 by soil, Area 5 is sparsely vegetated. It is influenced directly by the tide.

Breakwaters shelter Area 6, which is bordered by the Bay. The vegetation in this sub-region consists entirely of salt marsh vegetation, comprising 5 percent cover; the rest of the area is bare ground.

Area 7 is a patch of land within the salt marsh that is Area 6. Its elevation is much higher than the neighboring marsh. A variety of plants grow in this sub-region. Thirty-nine percent of the area is covered by salt marsh species. The ground in this area is often soggy; it was never observed to be flooded by the tides.

Because Area 8, a densely covered salt marsh, is fenced in on the private property of Stauffer Chemical Company, it was not sampled. Whether it receives limited tidal action or another source of water is not clear. The sub-region is frequently flooded.

Affected indirectly by the tides, Area 9 is a diked salt marsh. The vegetation is very dense, comprising 88 percent cover. Non-salt marsh species grow around the edges.

Area 10 is at a higher elevation than either of the salt marshes adjacent to it (Areas 9 and 11). It supports a variety of plants, 37 percent of which are salt marsh species. It is sometimes soggy but has never been observed to be flooded. There is a lot of refuse, including stripped and rusted furniture and appliances.

Area 11 is a diked marsh into which tidal action has recently been increased (Siegel, 1985). Plant coverage is by salt marsh species only and is 9 percent.

Discussion and Recommendations

The conditions required for salt marsh plant growth are met in all of the mapped sub-regions in the study area. Areas 1, 5, 6, 8, and 11 support exclusively salt marsh plants, whereas Areas 2, 3, 4, 7, 9, and 10 support both salt marsh and non-salt marsh species. The sub-regions in which both types of plants grow have usually been disturbed, for example, by changing the elevation by dumping dredgings in a marsh. There is a higher percent cover of salt marsh vegetation in these sub-regions (36-88 percent) than in those supporting only salt marsh plants (0.15-13 percent). Differences in percent cover may be attributed to differences in biological and physical parameters among the sub-regions.

Analysis of Jurisdictions

Many of the 11 sub-regions are protected by BCDC, the Corps, or both agencies. If development were proposed in the study area, the developer would be required by BCDC to hire an engineer or a geologist to locate the 100 foot band measured inland from high high tide, to establish the boundaries of their jurisdiction. All of the sub-regions that are flooded, directly or indirectly, by the tides, and all of the sub-regions that have salt marsh plants growing in them, will be preserved (unless it were deemed absolutely necessary to use the site for a water-oriented purpose) according to BCDC policies (Hind, 1987, pers. comm.).

Areas 2, 4 and 10, however, are not affected by the tides. Non-salt marsh species make up the majority of plants growing in these sub-regions, and few salt marsh species are interspersed. These sub-regions do not look like salt marshes; they are drier patches of land at slightly higher elevations relative to the other sub-regions. Whether or not these lands are in BCDC's jurisdiction, and whether the Corps would find them worthy of preservation if development were proposed is unclear.

Although salt marsh plants do not predominate in Areas 2, 4, and 10, they are able to exist under the environmental conditions in these sub-regions. The presence of salt marsh plants, an indication that the environmental factors necessary for salt marsh growth are present, should be a more important consideration for the people deciding whether to preserve or develop a site near the shoreline than the abundance of salt marsh plants, especially since mitigation is a policy. BCDC's jurisdiction is defined geographically, rather than by environmental factors, but these boundaries include many regions that have the conditions necessary for salt marsh plant growth. The Corps attempts to define its jurisdiction by environmental conditions but the definition is inadequate because it is vague and inconsistently interpreted.

Mitigation

The technologies used to create or enhance salt marshes are in experimental stages. Since they have not been proven to be effective in all cases (Race, 1987, pers. comm.), it is appropriate to try them only in areas that have the least salt marsh value to lose. Since the environmental conditions essential to salt marsh plant growth are being met in Areas 2, 4, and 10, these sub-regions should be preserved, and examined as potential mitigation sites. Factors such as distance to water circulation channels, seasonal precipitation, water content of the sediments, and pH and salinity of the sediments and water, should be compared to those of a model salt marsh to see which are missing or inadequate to sustain marsh species. The identification of these conditions in possible mitigation sites would be useful information for determining whether or not they could be restored to healthy salt marshes. For example, water input could be increased in Area 10, by digging a hole in the dike and piping more Bay water towards this sub-region; or the elevation could be lowered, by removing some of the soil, so that the tide would run into this sub-region. It is recommended that studies be done comparing the

environmental conditions of Areas 2, 4, and 10 to those of an ideal salt marsh, and investigating methods of restoration and creation of salt marshes. Such studies might be appropriate for the University of California since it is interested in expanding the Richmond Field Station.

Other mitigation could be done in the study area by simply removing the debris, including hundreds of dumped rubber tires, from the site. Improvement of this sort, as opposed to using heavy equipment in a marginal marsh, has a low risk of detrimental impact, and would increase the visual appeal of the area and perhaps appreciation of what is frequently considered wasteland.

Planning

Contrary to the city of Richmond's preservation goals, which were mentioned in the Background section of this paper, the study area is zoned industrial in the city's plans. Because the entire study area is not covered by salt marsh it is likely that developers will make proposals in this area. Social needs, such as employment and housing, are of more immediate concern to Richmond planners than environmental concerns, such as salt marsh preservation; it is in the city of Richmond's interest to widen its economic base by developing more land, thus creating more jobs and employing more people. Since there are legislation and agencies designed to preserve salt marshes in place, and there are guidelines, however vague, to determine what is and is not a salt marsh, any plan for development must include specific plans for salt marsh preservation. The limited freeway capacity (Dickey, 1987) and geologic constraints to building (Bourg, 1987) in the study area, and the fact that the region is potential habitat for an endangered species (Mahaney, 1987), combined with the necessity to preserve the salt marshes, build a strong case for only limited development of low-impact uses, perhaps of the sort discussed by Fong (1987) there.

The city of Richmond could do much to ensure limited, low-impact development. If the city council becomes concerned with this issue, it could re-zone the south shoreline between Point Isabel and Marina Bay as open space instead of industrial. Otherwise re-zoning involves writing a petition to make specific changes, qualification of that petition for a ballot in a city election, and passage of the initiative by the voters. In Berkeley's November 1986 election measures were passed that restricted development. City planners and citizens groups worked together in support of these initiatives. By a similar method, Richmond could re-zone the waterfront, or parts of it, in South Richmond as "open space" instead of "industrial" to follow through with its marsh preservation goals.

REFERENCES CITED

Bourg, Joseph, 1987. Seismic zonation and natural hazard assessment of a proposed development site along the South Richmond shoreline. In: Growing pains in the San Francisco Bay Area (Doris Sloan and Tod Fletcher, eds.); UC Berkeley Environmental Science Senior Seminar Report, Berkeley, California, pp. 203-213.

Dickey, Darell, 1987. The South Richmond shoreline growth potential and the I-180 (17) Hoffman Corridor. In: Growing pains in the San Francisco Bay Area (Doris Sloan and Tod Fletcher, eds.); UC Berkeley Environmental Science Senior Seminar Report, Berkeley, California, pp. 137-142.

Fiedler, Peggy, Professor, Department of Biology, San Francisco State University. Personal communication, October 1986.

Fong, Darren, 1987. The recreational potential of the South Richmond shoreline. In: Growing pains in the San Francisco Bay Area (Doris Sloan and Tod Fletcher, eds.), UC Berkeley Environmental Science Senior Seminar Report, Berkeley, California, pp. 143-152.

Hall, Goodhue, Haisley, and Barker, July 1986. Shoreline conservation and development strategy; Richmond, California, 126 pp.

Hind, Margit, Bay Design Analyst, Bay Conservation and Development Commission, San Francisco. Personal communication, March 1987.

Horwitz, E., 1978. Our nation's wetlands: an interagency task force report; Council on Environmental Quality; U.S. Government Printing Office, Washington, D.C.

Josselyn, Michael N. and James Buchholz, 1984. Marsh restoration in San Francisco Bay: a guide to design and planning. Technical Report #3, Tiburon Center for Environmental Studies, San Francisco State University, 104 pp.

Mahaney, Erin, 1987. Endangered species and development: the salt marsh harvest mouse. In: Growing pains in the San Francisco Bay Area (Doris Sloan and Tod Fletcher, eds.); UC Berkeley Environmental Science Senior Seminar Report, Berkeley, California, pp. 43-50.

McAteer-Petris Act, 1982. California Legislature, Governmental Codes, Title 7.2.

Nelson, Barry, Program Director, Save the Bay Association, Berkeley, California. Personal communication, March 1987.

Oddi, Mark, 1982. The South Richmond marshes: an ecological analysis. In: East Bay shoreline (Doris Sloan, ed.); UC Berkeley Environmental Sciences Senior Seminar Report, Berkeley, California, pp. 207-221.

Race, Margaret, Principal Administrative Analyst/Science Policy Analyst, Division of Agriculture and Natural Resources, UC Berkeley. Personal communication, January 1987.

Siegel, Stuart, 1985. The rising of the tide-A study of marsh restoration. In: Open space and development in the Bay Area: Focus on the East Bay; (Doris Sloan, ed.); UC Berkeley Environmental Sciences Senior Seminar Report, Berkeley, California, pp. 1-14.

South Richmond Shoreline Special Area Plan Citizens' Advisory Committee (SRSSAPCAC), 1977. South Richmond Shoreline Special Area Plan; Richmond, California, 114 pp.