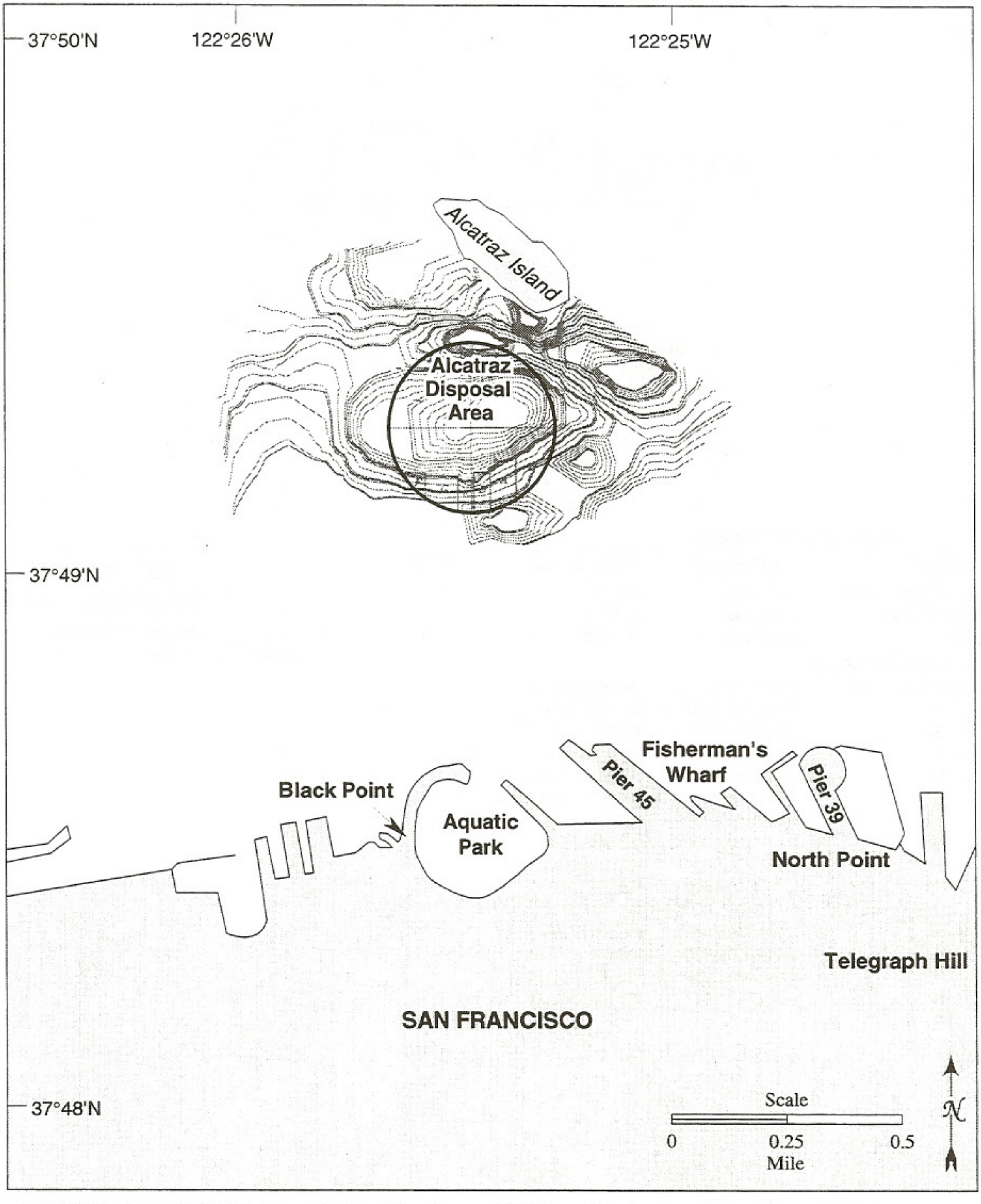
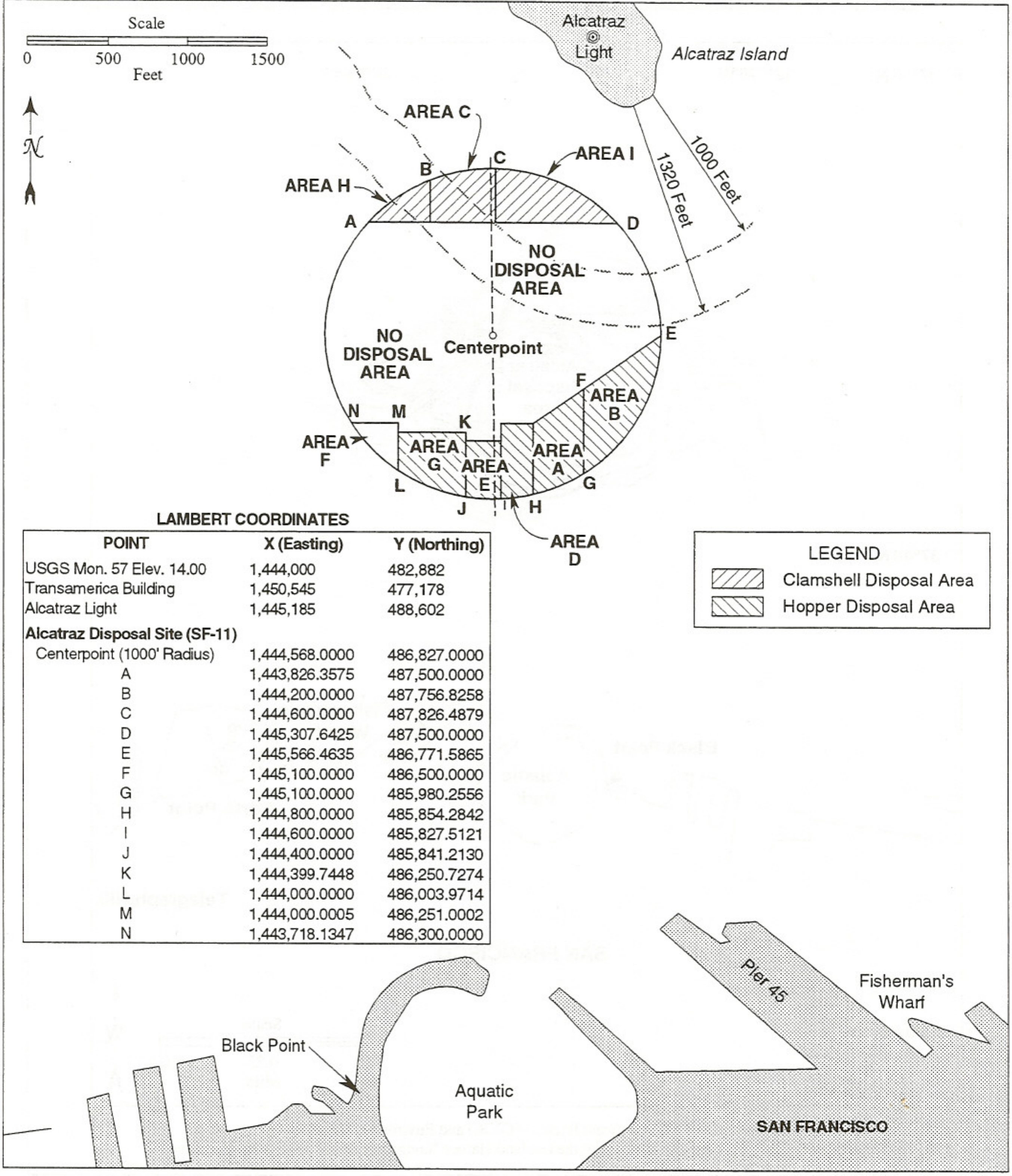


Source: COE 1992. Appendix D - Finding of No Significant Impact (FONSI) and Environmental Assessment, Oakland Inner Harbor 38-Foot Separable Element of the Oakland Harbor Navigation Improvement Project, June.

Figure 4.3-5. Alcatraz Open Water Disposal Site SF-11



LAMBERT COORDINATES

POINT	X (Easting)	Y (Northing)
USGS Mon. 57 Elev. 14.00	1,444,000	482,882
Transamerica Building	1,450,545	477,178
Alcatraz Light	1,445,185	488,602
Alcatraz Disposal Site (SF-11)		
Centerpoint (1000' Radius)	1,444,568.0000	486,827.0000
A	1,443,826.3575	487,500.0000
B	1,444,200.0000	487,756.8258
C	1,444,600.0000	487,826.4879
D	1,445,307.6425	487,500.0000
E	1,445,566.4635	486,771.5865
F	1,445,100.0000	486,500.0000
G	1,445,100.0000	485,980.2556
H	1,444,800.0000	485,854.2842
I	1,444,600.0000	485,827.5121
J	1,444,400.0000	485,841.2130
K	1,444,399.7448	486,250.7274
L	1,444,000.0000	486,003.9714
M	1,444,000.0005	486,251.0002
N	1,443,718.1347	486,300.0000

Figure 4.3-6. Alcatraz Disposal Site: Areas of Clamshell vs. Hopper Disposal

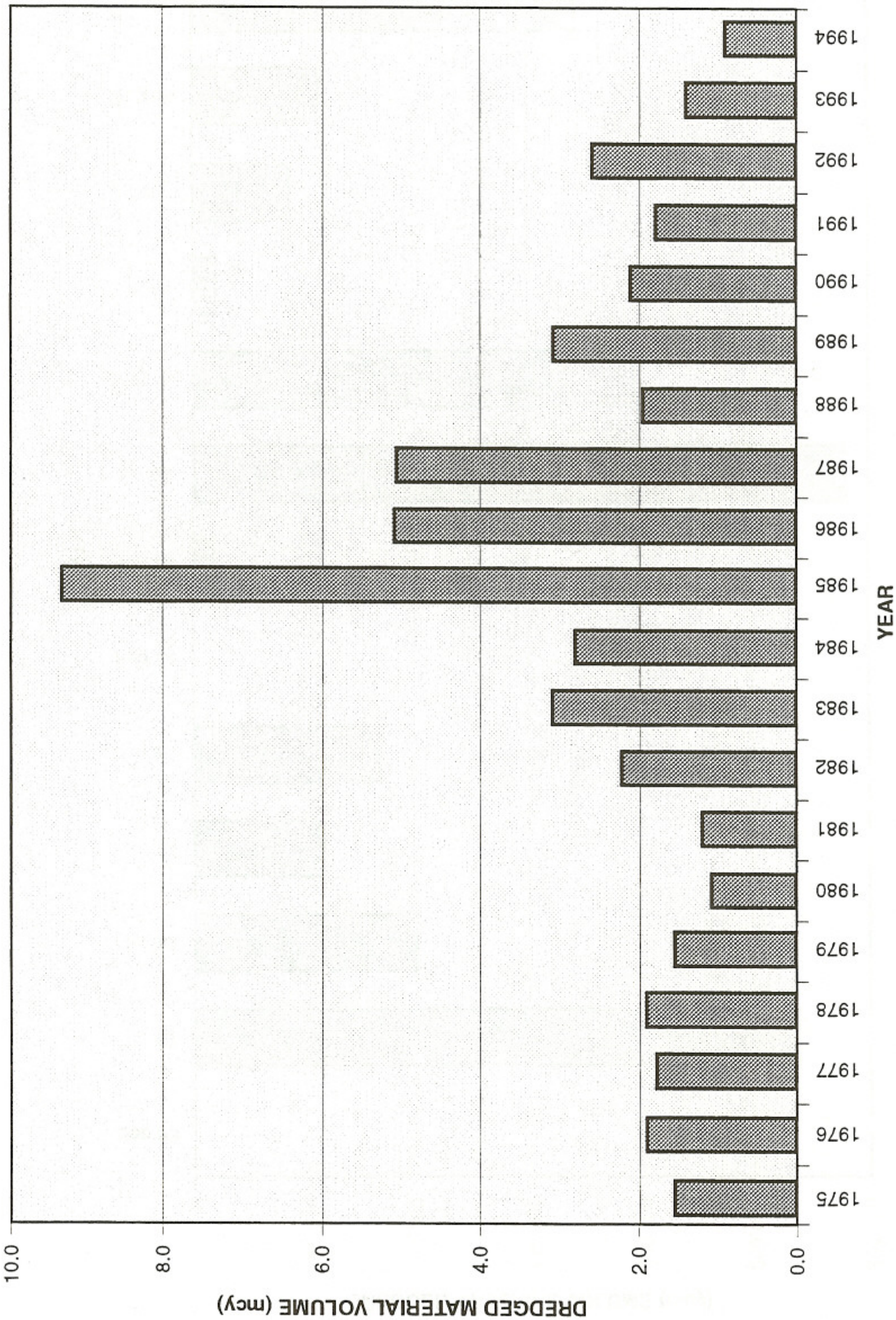
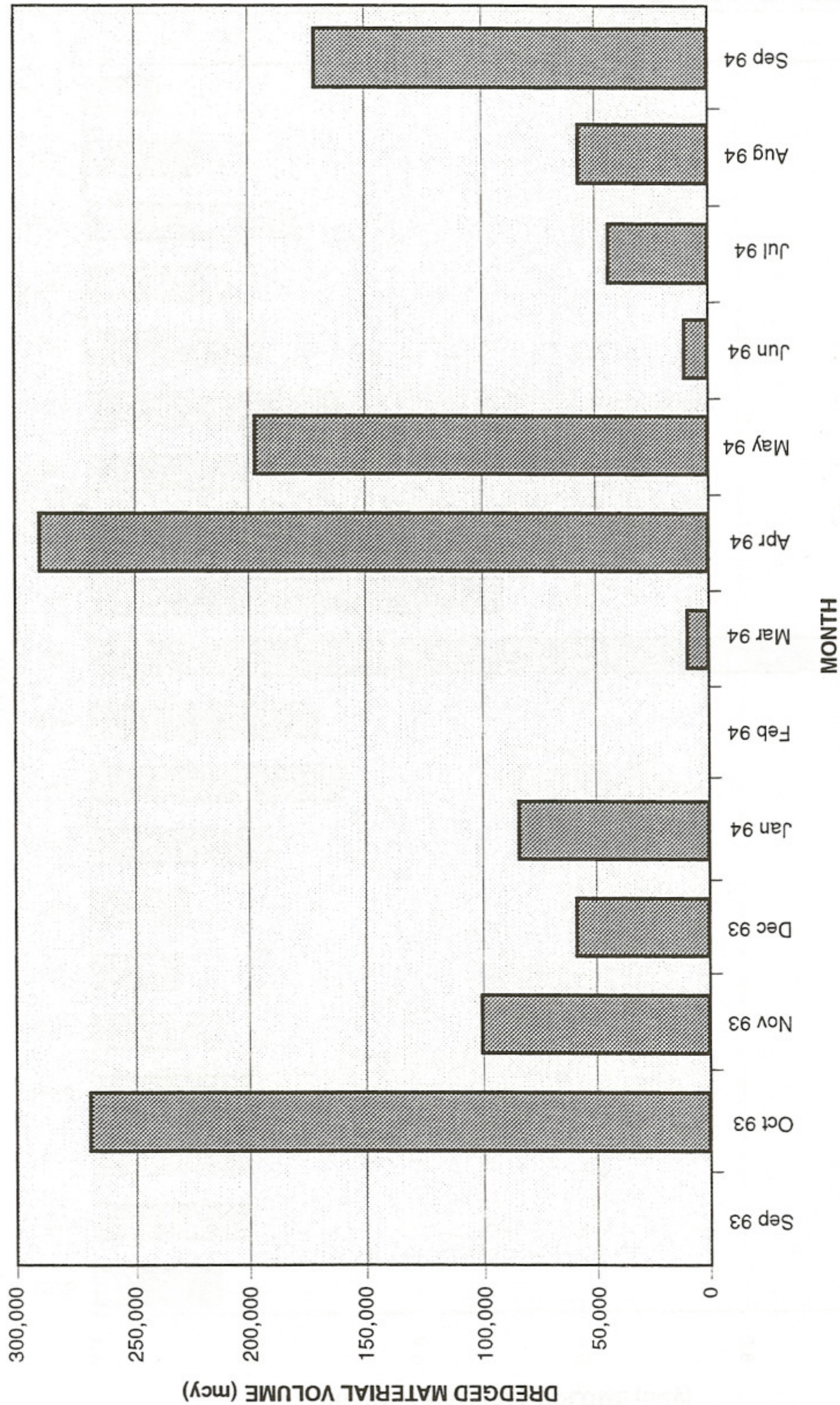


Figure 4.3-7. Annual Disposal Volumes at Alcatraz (1975 – 1994)



Source: COE Quarterly Reports

Figure 4.3-8. Monthly Disposal Volumes at Alcatraz (September 1993 – September 1994)

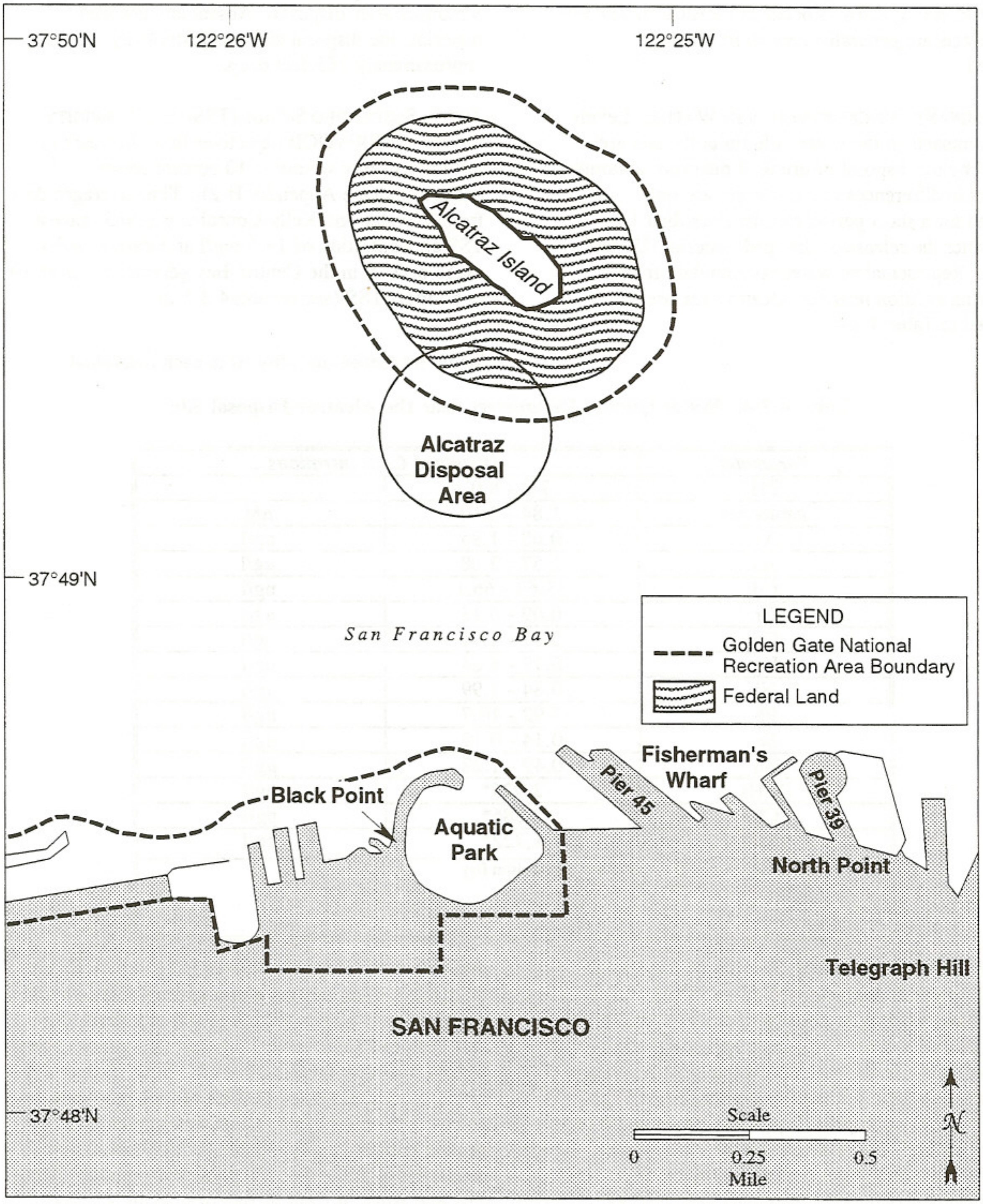


Figure 4.3-9. Alcatraz Disposal Site and Golden Gate National Recreation Area Locations

depression in DO levels on site. Some reductions in DO levels are expected to occur at theAlcatraz site but these effects are generally very short term and localized.

CONTAMINANT CONCENTRATIONS IN WATER. Levels of contaminants in the water column at the site are affected by the disposal of dredged material, although measurable differences in parameters are only observed for a short period of time (less than 1.5 hours) after the release of dredged material (USACE 1976d). Representative water column data from a monitoring location near the Alcatraz site are presented in Table 4.3-4.

changes in sediment composition on the site from 1 to 3 months after disposal. Absent any dredged material, the disposal site was historically approximately 165 feet deep.

TOTAL SUSPENDED SOLIDS (TSS) AND TURBIDITY. Current SFBRWQCB objectives limit increases in turbidity in Bay waters to 10 percent above background(see Appendix H-2). Time-averaged data from Winzler and Kelly Consultants (1985) gave a TSS concentration of 19.5 mg/l at Alcatraz, and a range of TSS in the Central Bay generally of from 10 to 60 mg/l TSS (see section 4.3.1.2).

While increased turbidity from each individual disposal event is not considered to be significant due to its short duration, the cumulative effect of multiple releases from barges occurring within a short time may result in significant, long-term elevations of near-bottom turbidity levels at the site. Such increases in turbidity over extended periods of time thus have the potential to significantly affect water column and benthic habitat quality outside the disposal site, as noted below in the discussion of environmental characteristics of Central Bay outside the Alcatraz site.

Table 4.3-4. Water Quality Parameters near the Alcatraz Disposal Site

Parameter	*Dissolved Concentrations*	
PH	7.8 - 8.0	
Ammonia	1.84 - 2.10	μM
Ag	0.68 - 1.95	ng/l
As	1.57 - 2.08	μg/l
Cd	33.63 - 66.1	ng/l
Cr	0.09 - 0.13	μg/l
Cu	0.87 - 1.91	μg/l
Hg	0.79 - 1.64	ng/l
Ni	0.84 - 1.99	μg/l
Pb	7.92 - 10.7	ng/l
Se	0.14 - 0.19	μg/l
Zn	0.49 - 1.22	μg/l
PAHs	2,926*	pg/l
PCBs	2,886*	pg/l
Pesticides	1,722*	pg/l

Notes: Sampling Station at the mouth of Richardson Bay
* sample taken at the Golden Gate
Source: SFEI 1994.

SEDIMENT CHARACTERISTICS. The native material at the Alcatraz site is characterized by predominantly fine to coarse sand, with pockets of finer silt and areas of bedrock and boulders just south and southwest of Alcatraz Island. In the area immediately surrounding the Alcatraz site, the sediment is comprised of 81 to 98 percent sand with up to 17 percent gravel and 0 to 6 percent silt and clay (USACE 1993). In contrast, much of the material from dredging projects is predominantly clay and silt from channels. Cores taken at the site show that recently disposed dredged material is a mixture of clays with clayey sands, while older dredged material is primarily clays (LTMS 1994j). The high rate of disposal at the site has also resulted in a heterogeneous substrate. A study by SAIC (1987b) showed that there were no significant

CONTAMINANT CONCENTRATIONS IN SEDIMENT. Sediment quality at the Alcatraz site is highly variable. However, historic use has resulted in elevated levels of pollutants within the boundaries of the site. Sediments at the site generally contain elevated levels of most metals, oil and grease, TRPHs, and PAHs compared to sediments in the surrounding area (e.g., Alcatraz environs). Pesticides and PCBs were often not detected during sampling conducted in 1991 and 1992. Current sediment contaminent levels at the Alcatraz site are presented in Table 4.3-5.

AQUATIC RESOURCES. The primary aquatic resources within the boundaries of the Alcatraz site that could potentially be affected by dredged material disposal are those associated with the benthic community. Other resources such as phytoplankton, zooplankton, pelagic fish, and wildlife are discussed below in the context of the broader Central Bay embayment.

Environmental Characteristics of Central Bay Outside the Alcatraz Disposal Site Potentially Affected by Dredged Material Disposal

Much of the sediment disposed at the Alcatraz site does not remain within site boundaries. A small fraction remains in the water column as the bulk of the material initially falls to the Bay floor during disposal operations. Following disposal, material is resuspended by currents and dispersed over a wide area, with the extent of dispersal depending on a number of complex, interrelated factors (see Chapter 3). Therefore, disposal of dredged material at the Alcatraz site has the potential to affect resources over a broader area. This section describes the environmental characteristics of the Central Bay outside the Alcatraz site that could be affected by dredged material disposal.

Table 4.3-5. Physical and Chemical Parameters Measured in Alcatraz Disposal Site Sediments

Parameter	*Source (1)*	*Source (2)*	*Source (3)*
Grain Size (percent)			
Gravel	0	5	0
Sand	98	61	15
Silt	0	14	40
Clay	2	20	45
Total Organic Carbon (percent)	0.05	0.43	0.94
Total Volatile Solids (percent) (Dry wt.)	1.2	4.89	8.61
Organic Contaminants (μg/kg)			
Tributyltin	<1.0	<0.8	
Dibutyltin	1.1	<0.7	4.2
Monobutyltin	<1.0	1.3	1.0
Oil and Grease (mg/kg)	7	115	92
TRPH (mg/kg)	5	110	78
DDT and metabolites	<5.0	3.33	<4.0
total PCBs	<20	ND	<35
total PAHs	759	36,830	2,983
Metals (mg/kg)			
Arsenic	6.92	11.7	10.7
Mercury	0.08	0.183	0.306
Selenium	<0.11	0.13	0.21
Cadmium	0.07	0.21	0.23
Chromium	171	414	229
Copper	10	32.2	56.1
Lead	14.7	23.1	24.4
Nickel	37.6	80.4	104
Silver	0.026	0.201	0.320
Zinc	34.1	78.2	115.3

Notes: (1) Battelle 1992a (Phase IIIB)
(2) Battelle 1992b (Berths)
(3) Battelle 1992c (Phase IIIA repeat)
Source: USACE and Port of Oakland 1994.

WATER QUALITY. In general, water quality parameters such as pH, DO, ammonia, salinity, and pollutant levels are affected by disposal of dredged material, but these changes are only expected to be short term and localized near the site. Thus, water quality within the Central Bay is expected to be only marginally affected by disposal, assuming that disposal events are much less frequent than the time it takes disposal plumes to fully diffuse.

SEDIMENT CHARACTERISTICS. The floor of much of the Central Bay consists of sand and coarse channel-bottom sediments formed from strong currents focused along narrow channels. The sand deposits form waves as high as 8 m that, over time, move with strong ebb and flood tidal flow through the Golden Gate (Rubin and McCulloch 1979). The only part of Central Bay that is predominantly mud is the shallow eastern shoreline (Nichols and Pamatmat 1988). Characteristics of the surface sediment vary according to seasonal riverine flow, material transport, and wave-induced suspension of material in shallow areas during the summer.

Disposal of fine-grained material from channels and harbors at Alcatraz has the potential to alter benthic habitat characteristics both in the immediate area of the site and in the off-site habitats located at the margins of the embayment that are sensitive to burial and/or changes in the seasonal patterns of sediment deposition and erosion. The habitats and resources of concern are described below under Benthos.

SEDIMENT DYNAMICS. Transport of suspended material in Central Bay is dominated by strong tidal currents in the main channels and wind-driven currents in shallower areas, particularly along the eastern margin. The fate and transport of suspended sediments is of great interest since a substantial portion of dispersed dredged material may be redistributed across the entire Bay instead of being moved out to the ocean, as assumed in the past.

Concerns have been expressed about intertidal impacts at Alcatraz Island from nearby dredged material disposal operations at the Alcatraz disposal site. Inquiries to the National Park Service (NPS), which manages the adjacent Golden Gate National Recreation Area (GGNRA), indicate that there is no quantitative information on this issue. However, anecdotal evidence from ranger observations and visitor complaints indicate that sediment from the disposal site washes onto the shores of the island. Disposal barges may sometimes get too close to the island, may be outside the designated disposal area, and are probably in GGNRA territory. In addition, sediment plumes may sometimes extend to the island, and sediments and tar may be deposited in the high intertidal area. However, it is not certain whether the sediment deposited in the intertidal area is from upstream sources in the Bay watershed or from disposal operations at the Alcatraz disposal site (personal communication, Darren Fong, NPS Biologist, 1997).

TOTAL SUSPENDED SOLIDS AND TURBIDITY. Recent data on suspended solids levels in the Central Bay collected using optical backscatter sensors indicates that turbidity levels in this embayment are typically much lower than in the rest of the Estuary. Measurements taken off the western edge of the Bay Bridge during the 1992 and 1993 water years indicate average concentrations of 29 mg/l at 13 feet above the Bay floor, and 36 mg/l near the bottom in a deep channel (41 feet MLLW depth). In addition, these data indicate less long-range variability in suspended solids levels in the deep channel in this embayment compared to other Bay sites (Buchanan and Schoellhamer 1994). However, there can be a large degree of instantaneous variability in TSS levels in the Central Bay associated with tidal action. Therefore, time averaged TSS data or data from discrete grab samples are not adequate to fully determine the influence of dredged material disposal on the Central Bay environment. Peak levels of TSS are likely to be related, in part, to dispersion of dredged material from the Alcatraz site, since the site is now actively managed to maximize dispersion and minimize mounding.

SEDIMENT QUALITY. Sediment quality data for "Alcatraz Environs" (which has been used as the reference site for dredged material testing since Public Notice 93-2, and includes sampling stations outside of the dredged material mound itself) is presented in Table 4.3-6. Generally, contaminant concentrations in these sediments are lower than those observed at the Alcatraz disposal mound. Nevertheless, recent data show that concentrations of some contaminants such as PAHs and PCBs have been increasing over time. It appears that ongoing disposal and/or site management to maximize dispersion and minimize mounding at Alcatraz is having influences on sediment quality in the Central Bay beyond the boundaries of the disposal site.

Table 4.3-6. Levels of Pollutants Measured in Alcatraz Environs Sediments

Parameter	*Source (1)*	*Source (2)*	*Source (3)*	*Source (4)*
Grain Size (percent)				
Gravel	3	0	7	4
Sand	94	91	90	91
Silt	1	3	1	1
Clay	2	6	2	1
Total Organic Carbon (percent)	0.78	0.19	0.11	0.07
Organic Contaminants (µg/kg)				
Tributyltin	0.8	1.1	0.8	1.0
Dibutyltin	<1.2	<1.0	<0.6	1.6
Monobutyltin	<1.3	<1.0	1.0	<0.6
Oil and Grease (mg/kg)	41	<0.7	<1.3	13
TRPH (mg/kg)	<12	8	<1.3	<0.6
DDT and metabolites	0.5	<5.0	0.7	<2.0
total PCBs	<2.8	<20	<20	<24
total PAHs	5,129	1,620	669	139
Metals (mg/kg)				
Arsenic	9.1	6.55	8.01	13.2
Mercury	0.036	0.05	0.009	0.048
Selenium	<0.12	<0.11	<0.12	<0.08
Cadmium	<0.1	0.09	0.05	0.04
Chromium	190	156	136	121
Copper	11.5	12.4	11.7	11.4
Lead	15.2	14.4	13.8	11
Nickel	42.3	40.7	51.8	38.8
Silver	0.042	0.033	0.015	0.02
Zinc	36.8	37.7	32.3	35.4

Notes: (1) Battelle 1993 (Intensive Study)
(2) Battelle 1992a (Phase IIIB)
(3) Battelle 1992b (Berths)
(4) Battelle 1992c (Phase IIIA repeat)

Source: USACE and Port of Oakland 1994.

EELGRASS BEDS. Eelgrass (*Zostera*) beds are found only in the shallow areas of the Central Bay where the substrate is mud or mixed mud and sand. These beds form complex, important, and highly productive habitats. The eelgrass grows in low-energy areas and serves to stabilize sediment, providing a substrate for epiphytes, producing organic matter, and exporting detritus. It also provides a diverse habitat for invertebrates and provides forage, spawning, and nursery substrate for numerous species of fish (Chambers Group 1994). Eelgrass beds provide important foraging habitat for the endangered California least tern and other piscivorous birds. A 1987 aerial survey found 17 separate beds totaling 53 hectares (ha) in the Central Bay (Echeverria and Rutten 1989) (see Figure 4.3-10).

Eelgrass bed habitats are sensitive to the disposal of dredged material within the Central Bay embayment for several reasons. First, they exist in low-energy areas where suspended sediment naturally settles out of the water column. Second, excess siltation in these habitats can smother sensitive benthic organisms. One fish species that is particularly vulnerable to changes in eelgrass beds and other areas of aquatic vegetation is the Pacific herring, which spawns in and uses these areas as nurseries.

PHYTOPLANKTON AND ZOOPLANKTON. Phytoplankton and zooplankton populations in the Central Bay are largely dominated by influxes from ocean and South Bay waters. Ghost shrimp and oceanic species of krill enter the Bay as a result of extreme currents.

While material disposal may affect turbidity levels that, in turn, change the depth of the photic zone, this embayment is not among the most productive segments of the Estuary. Dredged material disposal within Central Bay is thus not expected to pose a risk to phytoplankton or zooplankton.

BENTHOS. Central Bay benthic habitats are diverse and include large areas of tidal and subtidal mudflats,

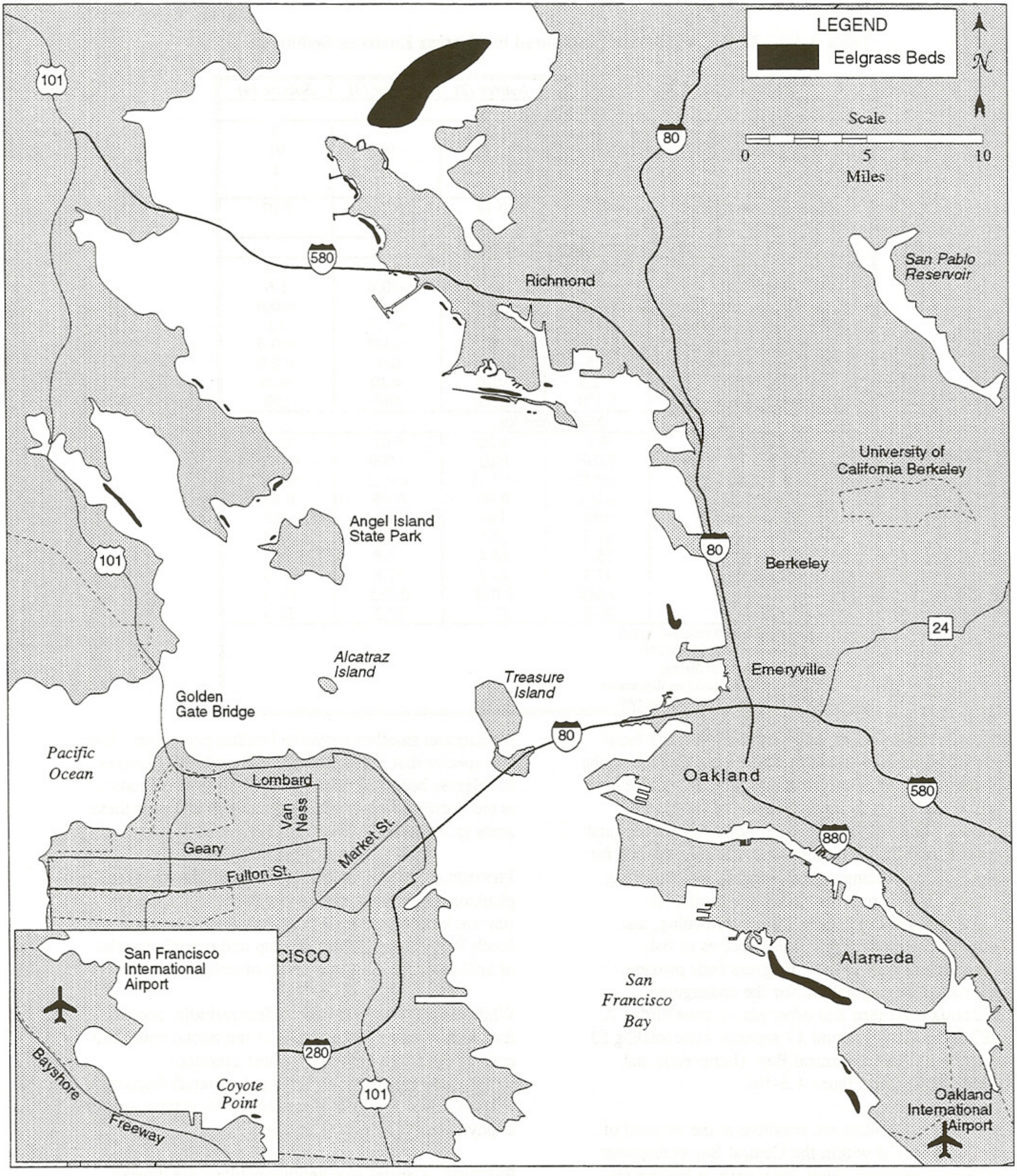


Figure 4.3-10. Eelgrass Beds in San Francisco Bay

subtidal shell deposits, sandy shoals, cobbles and exposed rocky outcrops. Each of these benthic habitats has its characteristic benthic community.

Benthic organisms that live in the deeper parts of the Central Bay are typical of those found in sandy sediments along the outer coast (Nichols and Pamatmat 1988). Density and species composition appear to be correlated with particle size and organic content of the sediments. Polychaetes *Armandia brevis*, *Mediomastus* sp., *Siphones missionensis*, and *Glycinde picta* are commonly encountered. The amphipod *Foxiphalus obtusidens* and the crab *Cancer gracilis* also are common. All of these are native species. The benthic community associated with sand sediment is not well-adapted to silt and clay and is susceptible to numerous impacts related to the disposal of this material in this embayment.

Rocky outcrops are a benthic habitat that is important but less common in the Central Bay. There are several rocky outcrops, including Harding Rock, Shag Rock, and Arch Rock (LTMS 1994j). These rocky outcrops are inhabited by hard-substrate organisms with marine affinities such as the native bay mussel *Mytilus galloprovincialis*. Large numbers of the clams *Tapes japonica* and occasionally *Mya arenaria* are found in discrete intertidal beds, particularly in the narrow band of rock, cobble, and broken concrete riprap along the base of dikes, piers, and breakwaters (Nichols and Pamatmat 1988).

Organisms that inhabit rocky outcrops, like those adapted to sandy substrates, are likely to be affected by dredged material disposal in the area. A primary concern is burial and covering of these surfaces by fine sediments that settle out some distance from the disposal site. Other concerns relate to the adaptability of hard-surface organisms to short- and medium-term increases in turbidity.

FISH AND SHELLFISH. Fish commonly found in Central Bay include the northern anchovy, halibut, American shad, chinook salmon, bay goby, white croaker, Pacific staghorn sculpin, and marine surfperches. Within the Estuary, the English sole is found most abundantly in Central Bay. Pacific herring spawn in the eelgrass beds and other areas of aquatic vegetation in Central Bay within the vicinity of Angel Island and the Tiburon Peninsula between December and March. Except for striped bass, all of the species commonly found in Central Bay are native. In recent years, the species composition of fishes has remained relatively stable. The overall abundance also has remained relatively stable, except for annual fluctuations in northern anchovy and Pacific herring stocks, an increase in white croaker abundance, and a decrease in longfin smelt abundance.

Shiner surfperch, jacksmelt, topsmelt, diamond turbot, and the speckeled sand dab are common in shallow waters around Central Bay. Anadromous fish such as the striped bass, steelhead trout, chinook salmon, and the white and green sturgeons migrate from the ocean to upstream spawning areas. The leopard shark, seven-gill shark, and the brown smoothhound are abundant in the intertidal mudflats of the Central Bay.

Pelagic species such as the northern anchovy, Pacific herring, and jacksmelt dominate catches from surveys conducted by the CDFG in Central Bay (SFEP 1992a). The sand substrate and rock outcrops in the Central Bay support recreational fish such as the halibut, striped bass, rockfish, and lingcod.

There are three basic concerns regarding the potential impact of dredged material disposal on resident and migratory fish species: disruption of habitat, physiological effects on fish species, and avoidance by fish of the area around the disposal site. During periods of intense disposal, fish avoidence can affect a significant portion of the broader embayment. Avoidance may interfere with foraging habitat and food resources, but there is little information available with which to evaluate those effects (SFEP 1992a). Field studies at the Alcatraz site indicate that fish may disperse after individual disposal events due to acoustic effects or turbidity, but return within an hour or two (O'Connor 1991).

SPECIES OF SPECIAL CONCERN. Fish species of special concern identified by the resource agencies within Central Bay are the chinook salmon, coho salmon, Pacific herring, and recreational marine fishes. The chinook salmon are of greatest concern. While little information exists on potential effects of sediment disposal at Alcatraz on this species in Central Bay, disposal activities could degrade water quality and/or habitat, directly affecting adults and juveniles in the vicinity. The Pacific herring is another species of concern in Central Bay. Impacts on the herring are most likely to be associated with dredging (as opposed to dredged material disposal at Alcatraz) and may include interference with spawning activity, and reduced hatching success and larval survival. Concerns have been expressed about the potential impact on herring spawning in the vicinity of the Alcatraz disposal site. According to the California Department of Fish and Game (CDFG), herring do spawn each year along the perimeter of Alcatraz Island starting in December (personal communication, Diane Watters, CDFG Biologist, 1997). Whether there is any adverse impact on herring spawning from disposal operations at the Alcatraz site is unknown.

Other special concern species that occur in the Central Bay include the peregrine falcon, brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse.

Although impacts associated with individual disposal events are thought to be temporary and therefore of little concern (particularly for migrating species that could avoid the area), cumulative effects associated with frequent disposal events over a limited period of time could be of more concern for these species.

WILDLIFE RESOURCES. Typical birds of the open water of the Central Bay are the western grebe, scaup, canvasback, surf scoter, and the osprey. The common loon, American coot, and Caspian tern also use the open water habitat of the Central Bay. Particular to the rocky shore areas are cormorant, black oystercatcher, and western gull. Mallards, rails, black necked stilts, and the salt marsh yellowthroat use the marshes around the Central Bay. California sea lions and harbor seals use open water, rocky shore, and intertidal mudflat habitats of the Central Bay.

The following is a brief summary of some of the sensitive biological resources on and in the immediate vicinity of Alcatraz Island. Figure 4.3-11 shows the location of a number of sensitive biological resources.

While Alcatraz has historically been home to a variety of waterbirds, increased human disturbance and use of the island present an ongoing challenge to wildlife management. For example, more than 1 million people visit the 20-acre island annually. Prior to 1981, only two colonial nesting species, the black-crowned night-heron and the western gull, were documented on the island. In 1981, San Francisco Bay's only pigeon guillemot colony was discovered on Alcatraz. Since 1981, increased wildlife protection by the National Park Service (NPS) has resulted in increases in the number of colonial nesters. Pelagic and Brandt's cormorants first bred on the island in 1993, followed by great egrets and black oystercatchers in 1995. With increased protection under NPS management, the numbers of colonial nesters increased dramatically during the 1980s and reached an all-time high in 1996, when over 1,000 pairs of colonial waterbirds of six species bred on Alcatraz (Hatch et al. Undated).

Concern has been raised about the possible adverse effects of dredged material disposal at Alcatraz on the birds that nest on the island. One study (Hothem 1996) evaluated the effects of environmental contamination on the reproductive success of the black-crowned night-heron nesting on Alcatraz Island from 1990 to 1996. From 1990 to 1995, between 90 and 200 night-heron nests on the island were monitored each year. In every year, nesting levels either remained constant or increased. In 1996, more nests (341 nests) were monitored, but less often (the nests were visited only four times during that year). In that year, nesting success was lower, but the difference was not statistically significant, and fledgling success was also lower. While no abnormal embryos were found during 1996, the number of dead chicks was higher, although these data have not yet been analyzed.

A 3-year study (Brown 1996) evaluated the breeding success of the western gull colony on Alcatraz Island (Figure 4.3-12) as a function of parental investment in the chicks. From 1992 to 1996, the western gull population on the island fluctuated, peaking in 1996 with 566 nests. The 1996 peak coincided with similar peaks in the number of nesting black-crowned night-herons and Brandt's cormorants on the island.

A study of Brandt's cormorants nesting on Alcatraz in 1996 (Fairman et al. 1997) revealed that the breeding colony is relatively productive and affected little by island-based and external disturbances (e.g., local sea and air traffic). Disturbances to the colony were recorded frequently, but rarely were effects on the breeding cormorants detected. Overall, the productivity of Brandt's cormorants on Alcatraz compared favorably with that observed in both the established offshore Farallon Island population and a small coastal population at the Point Reyes headlands. However, because the Alcatraz population's annual variation is considerable and the colony's establishment is relatively new, the success of these birds is still unknown. Pigeon guillemots, pelagic cormorants, and black oystercatchers were also documented on the island, although monitoring of these birds was less detailed than the monitoring of Brandt's cormorant. The study recommended that public access restrictions remain in areas where

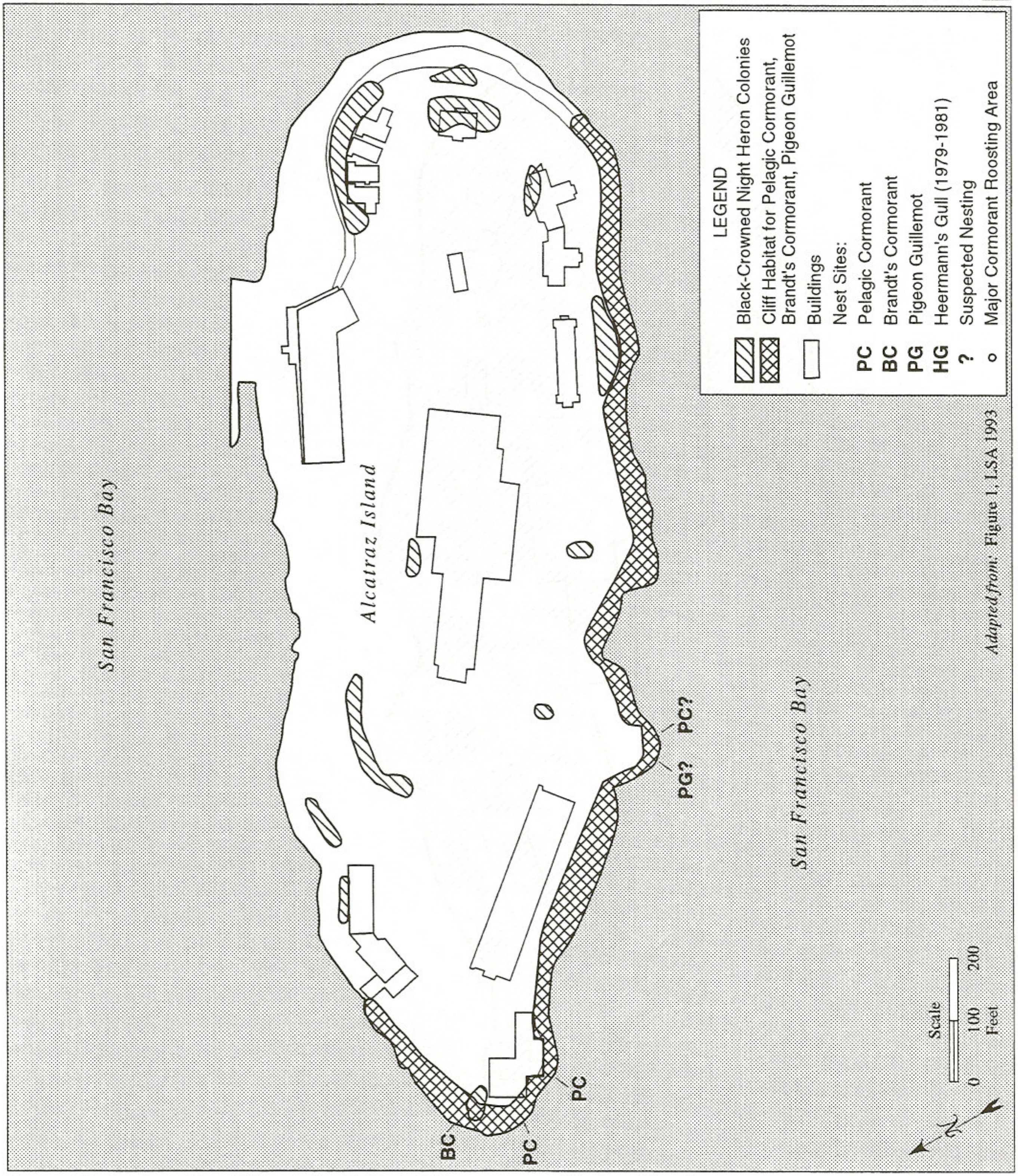


Figure 4.3-11. Location of Sensitive Biological Resources on Alcatraz Island

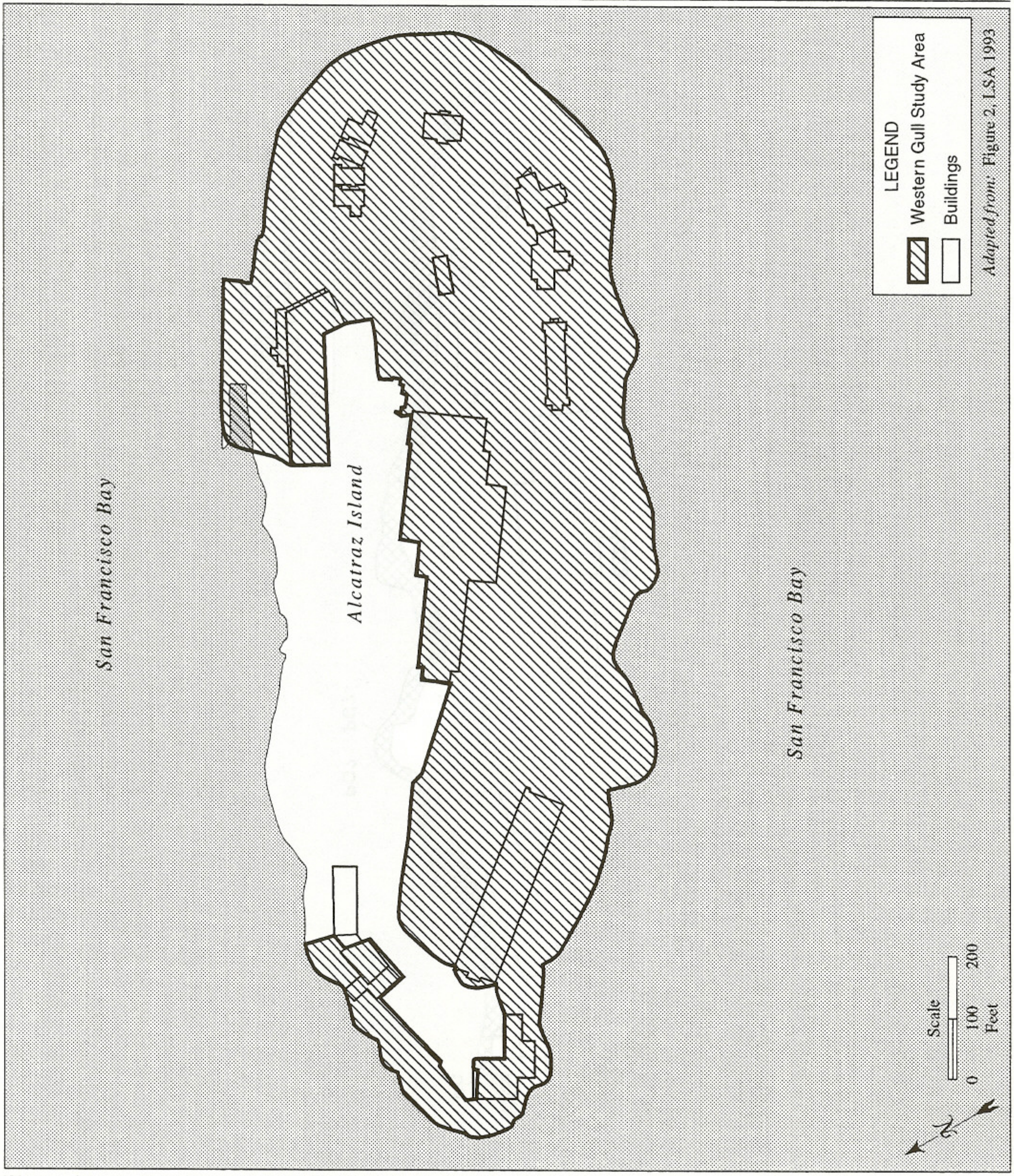


Figure 4.3-12. The Western Gull Study Area on Alcatraz Island

colonial waterbirds nest. The current restrictions are considered sufficient, but if new areas are opened for visitors, disturbances may increase.

Existing Monitoring Programs

Currently there are two types of monitoring conducted for in-Bay aquatic disposal: mapping of the disposal site (i.e., bathymetric charts), and Estuary-wide contaminant monitoring; these two types of monitoring are described below. In addition, all dredged material undergoes a pollutant evaluation prior to receiving approval for disposal.

For the first type of monitoring, the Corps of Engineers conducts monthly surveys of the Alcatraz disposal site and quarterly surveys of the San Pablo Bay and Carquinez Strait disposal sites using its own survey crew. The purpose of this monitoring is to detect and monitor changes in the shape of the bottom (topographic) and changes in the depth, particularly as changes in depth could cause the site to become a navigational hazard.

The second type of monitoring concerns contaminant and sediment transport from the disposal site to surrounding waters. The disposal sites currently in use are considered "dispersive" sites, i.e., sediment disposed of at the site is intended to be moved to other areas, with some unknown fraction transported out of the Bay through the Golden Gate to the Pacific Ocean. Since the dispersive disposal method moves all sediments into the ecosystem, there is a high potential for pollutants present in the sediments to have harmful effects. For many classes of pollutants, the act of dredging and disposal at the in-Bay sites will actually *increase* the contact that organisms have with the particle-bound contaminants in the Estuary, i.e., make them more "bioavailable." Section 3.2.2.2 discusses concerns about pollutants. While there is currently no *on-site* contaminant monitoring of the disposal sites, all the dredged material approved for disposal must first be evaluated for pollutant load and toxic effects. In most cases, sediments are subjected to chemical analysis and bioassays as part of the permit process. The goal is to ensure that the dredged sediment approved for disposal at these sites is free of significant levels of contaminants.

This second type of monitoring could be considered "off-site" monitoring in that it is the monitoring of conditions beyond the disposal site. This "far-field" monitoring is known as the Regional Monitoring Program for Trace Substances (RMP). The RMP is carried out by the San Francisco Estuary Institute and overseen by the Regional Water Quality Control Board. Under the RMP, contaminants in Bay water, sediment, and shellfish tissue are tested several times a year at about 20 locations throughout the Estuary, from the Delta to San Jose. Station locations reflect the background (or "ambient") condition of the Bay and are not intended to be influenced by any one source of pollution. The goal of the RMP is to provide baseline data on aquatic media to determine pollutant loads, trends, and the overall health of the Estuary (i.e., is the Bay ecosystem getting healthier?). Additionally, the RMP monitors suspended sediment loads at various locations (on a continuous basis), evaluates new test methods, and conducts special and pilot studies related to contaminant fate and transport.

The RMP monitoring stopped in 1995 but began again in 1997. Unfortunately, no baseline data exist to determine if impacts are occurring. Thus there can be no comparison with and without in-Bay disposal.

The Corps conducts quarterly bathymetric surveys of the three existing in-Bay disposal sites, and keeps a record of these surveys for inspection by the Regional Board, other regulatory agencies, and interested members of the public upon written request to the Corps staff.

The Corps also keeps a record of all disposal events that take place at the in-Bay and ocean (aquatic) disposal sites in the San Francisco Bay area. A quarterly summary report (Quarterly Report) of all dredging activities in San Francisco Bay is available to the Regional Board staff and interested members of the public through the Dredged Material Management Office (DMMO), which is hosted by the Corps. The Quarterly Report contains the following information for each project: the name of the project, the dates dredged, the volume of material proposed for removal (in-place, surveyed), the dredged volume disposed (referred to as the "bin"), the disposal site(s) used, and the name of any affiliated dredging permit holders (permittees).

On a quarterly basis, the Corps provides a report summarizing the site capacity and topography for all three of the in-Bay disposal sites — SF-9, SF-10, and SF-11 — based upon recent bathymetric surveys. A written summary of disposal and reuse at upland locations is also included. This requirement is applicable to all dredging activities by public and private sector entities which occur in the quarterly period.

Material is sampled for contaminants prior to being disposed of at Alcatraz (SF-11) or is granted an exclusion from testing. The reference site for Alcatraz is sampled periodically to determine if there is any increase in contaminants at the reference site.

The limit of disposal of material at Alcatraz is required to conform with Public Notice No. 93-3.

Summary of Environmental Characteristics of Central San Francisco Bay Potentially Affected by Dredged Material Disposal

Table 4.3-7 presents the resources at the Alcatraz site and within the Central Bay embayment that may be affected by dredged material disposal. The magnitude of potential impacts depends on the overall amount and frequency of material disposed in the Central Bay over the course of the next 50 years and on the development and implementation of policies that will limit the adverse environmental effects of disposal.

Table 4.3-7. Summary of Resources of Concern for the Alcatraz Dredged Material Disposal Site and Central Bay

Resource	*On Site*	*Embayment*
Water Quality		
Dissolved oxygen	X	
Ammonia	X	
Pollutant levels	X	
Toxicity	X	
Sediment		
Characteristics	X	X
Bathymetry/dynamics	X	X
Quality	X	X
Total Suspended Solids/Turbidity	X	X
Aquatic Resources		
Habitats		
Benthos	X	X
Eelgrass		X
Rocky shore/reefs		X
Migratory corridor		X
Fish/Shellfish		
Herring		X
Crab		X
Bottom fish	X	X
Special Status Species		
Chinook salmon		X

4.3.2.2 San Pablo Bay

San Pablo Bay is bounded to the southwest by the Richmond/San Rafael Bridge and to the northeast by the mouth of Carquinez Strait. This embayment is characterized by extensive shallow water habitat and a variable salinity regime resulting from fluctuating freshwater inflow. Freshwater inflow is primarily from the Sacramento-San Joaquin river system with additional inflow from the Napa River, Petaluma River and Sonoma Creek. Seasonal fluctuations in salinities are considerable in San Pablo Bay, although salinities rarely fall below 5 ppt. Except for shipping channels, San Pablo Bay is comprised of shallow mudflats. The shallow waters of San Pablo Bay are characterized by high levels of suspended fine sediments throughout the year, a result of storms in the winter and strong winds during the summer. The San Pablo Bay disposal site is located in the south central portion of San Pablo Bay.

This section first describes the environmental conditions at the San Pablo Bay disposal site. This is followed by a discussion of environmental parameters within the broader embayment that may be affected by dredged material disposal at the San Pablo Bay site.

Environmental Characteristics of the San Pablo Bay Disposal Site

The San Pablo Bay disposal site ("SF-10") is a 1,500-foot by 3,000-foot rectangle located 0.3 mile northeast of Point San Pedro in San Pablo Bay (see Figure 2.2-1 and 4.3-13). COE records indicate disposal quantities ranged from less than 1,000 cy to a high of nearly one mcy in 1987 (Figure 4.3-14). Use of this site is currently limited to small projects of 100,000 cy or less, no more than 50,000 cy in one month, and a total annual disposal volume limitation of 500,000 cy. Monthly information on disposal volumes at this site is presented in Figure 4.3-15. The estimated capacity is 0.5 mcy per year and disposal is limited to 50,000 cy per month. Like Alcatraz, the San Pablo Bay site is considered dispersive.

WATER QUALITY. Water quality within the site is affected by the disposal of dredged material. However, measurable differences in water quality parameters are only observed for a short time after the release of dredged material.

SALINITY. Salinity is much more variable at the San Pablo Bay site, and in San Pablo Bay in general, than in the Central Bay or at the Alcatraz site. Salinity levels at a nearby monitoring station varied from 6 ppt in March to 26 ppt in September 1993, depending on river flow (SFEI 1994).

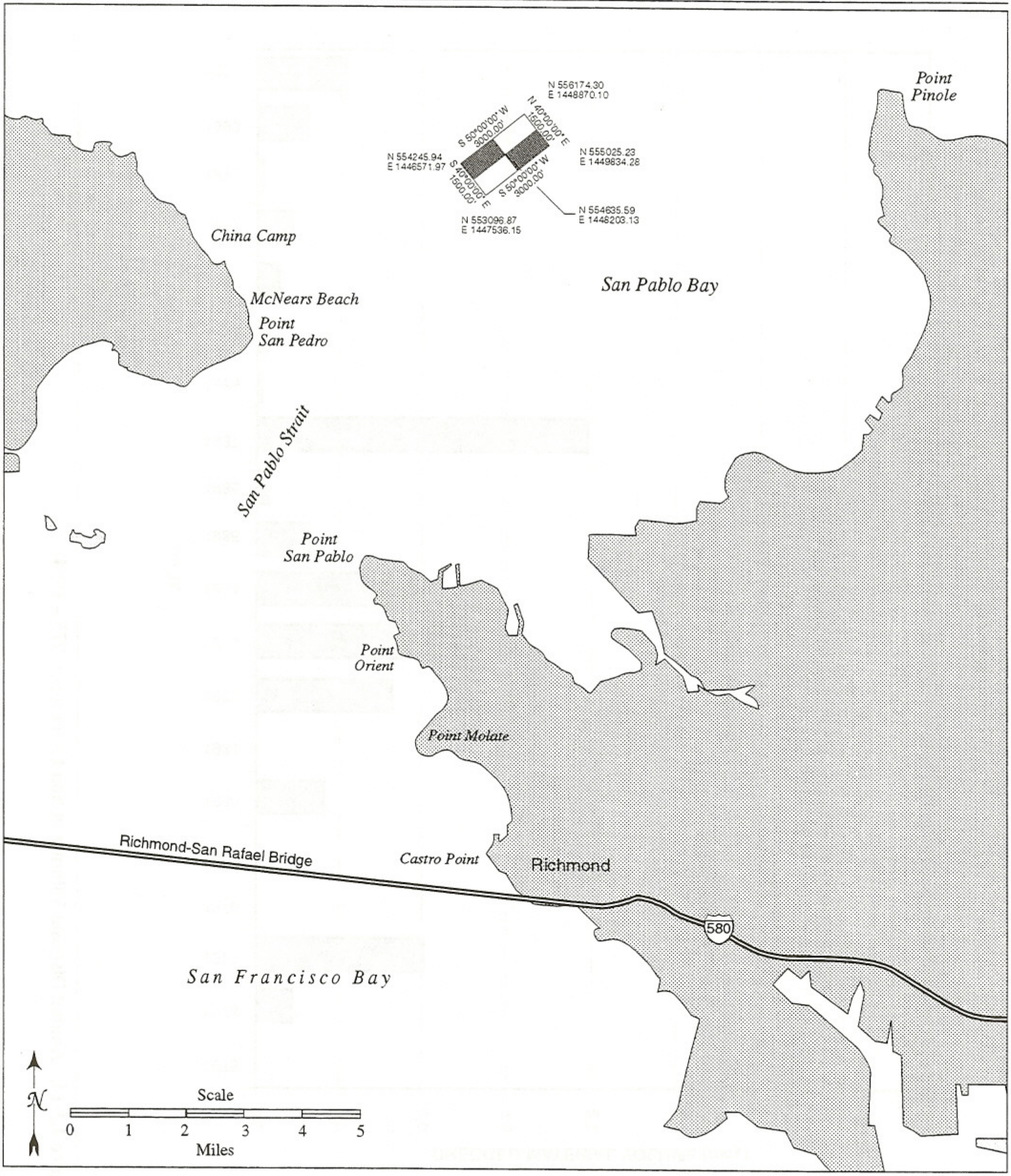


Figure 4.3-13. San Pablo Bay Open Water Disposal Site SF-10

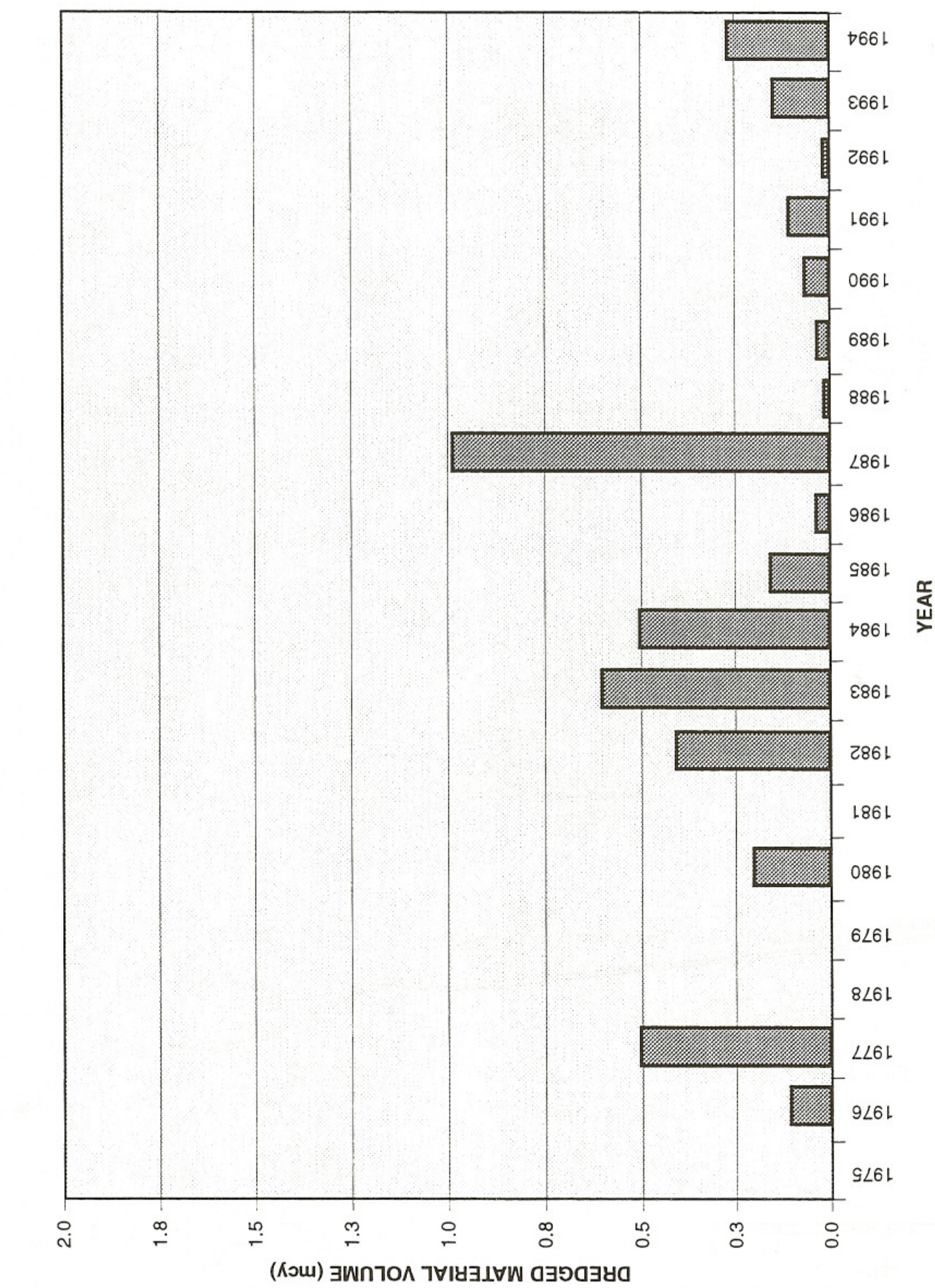


Figure 4.3-14. Annual Disposal Volumes at San Pablo Bay (1975 – 1994)