BENTHIC MACROFAUNA DATA FOR SAN FRANCISCO BAY, CALIFORNIA, SEPTEMBER 1986

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CONVERSION FACTORS

Metric units are used in this report. For readers who prefer inch-pound units, the conversion factors for the terms used in this report are listed below.

Multiply	By	To obtain
m^2 (square meters)	10.76	ft^2 (square feet)
cm (centimeter)	0.3937	in (inch)

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ABSTRACT

Benthic macrofauna were collected during September 1986 to evaluate locations for long-term monitoring stations as part of the U.S. Geological Survey Regional Effects Monitoring Program in San Francisco Bay, California. Three to ten replicate samples were collected with a modified Van Veen sampler (0.05 m^2 area) at ten locations. One box core sample (0.06 m^2 area) was collected at seven of the ten locations. Six of the box core samples were split into an upper 10 cm sample and a deeper sample before analysis. Macrofauna specimens were identified to the lowest possible taxon, usually genus and species, then counted.

An average of 88 percent of the benthic macrofauna specimens were identified to the species level. The fraction identified varied among stations from 54 to 98 percent. Nematodes and oligochaetes accounted for most of the unidentified specimens. Relative to the total number of species identified in five replicates at each location, an average of 90 percent of the species were collected with three replicates. In general, species with high to moderate abundances were present in all replicates, and species collected only after three or more replicates averaged less than one specimen per replicate. Results from the box cores showed that the dominant species were most abundant in the upper 10 cm, the depth of sediment that can be adequately sampled with a modified Van Veen sampler. Based on the number of species and their abundances at each location, seven of the ten locations were selected for sampling in the regular program, which began in March 1987.

Data presented in this report are available on the U.S. Environmental Protection Agency Ocean Data Evaluation System (ODES).

INTRODUCTION

The Aquatic Habitat Program, a plan for assessing the effects of pollutants on the biological resources of the San Francisco Bay-Delta estuary, was developed by the California State Water Resources Control Board. The Regional Effects Monitoring component of this plan was proposed to detect long-term effects of wastewater discharges on aquatic organisms in open-water areas of the estuary. This report describes the initial phase of implementation of one element of Regional Effects Monitoring in San Francisco Bay, the monitoring of long-term changes in the community structure of bottom-dwelling animals (benthic macrofauna).

Benthic macrofauna are a key component of estuarine ecosystems, and they are likely to be affected by pollutants because they reside on or in the bottom sediments, where some pollutants are concentrated by interactions with particles and organic matter. Large areas of San Francisco Bay are relatively far from the locations of pollutant discharges (U.S. Environmental Protection Agency, 1991). Relatively low levels of contamination by pollutants might exist in these primarily open-water areas, and adverse changes in the health of macrofauna communities might be evident only over long periods of time. A Technical Advisory Committee of scientists with expertise in the ecology of benthic macrofauna proposed the plan for long-term monitoring of such locations in San Francisco Bay. They suggested that evidence of major changes in the species composition and abundances might be a cause for concern about the health of a large part of the aquatic habitat. Implementation of the plan was described in an unpublished guidance document (California Regional Water Quality Control Board, Oakland, CA), but details were subject to change based on the results of an examination of the locations proposed for this monitoring.

Locations in San Francisco Bay that were proposed in the guidance document and additional locations where other programs previously have collected or currently are collecting samples for benthic macrofauna were investigated by the U.S. Geological Survey during September, 1986. Two locations (stations) were in areas that are sampled annually by the National Oceanic and Atmosperic Administration's Status and Trends program. One location in South Bay was near a station where long-term studies have been conducted by the U.S. Geological Survey. The objective was to identify eight locations that would be suitable for long-term monitoring of benthic macrofauna in the major sub-embayments of San Francisco bay. Criteria for acceptance of the locations for long-term monitoring included: stable soft-bottom substrate type, minimal spatial variability in substrate type at each location, and the ability to adequately describe the benthic macrofauna community in five or fewer replicates.

Acknowledgments

We wish to thank A.Y. Ota for assistance in preparing the tables, and G.A. Robilliard, F. Parcheso, and J. Edmunds for reviews of this report. Special thanks is extended to the captain and crew of the R/V David Johnston.

STUDY DESIGN AND METHODS

Stations were sampled for benthic macrofauna from the U.S. Geological Survey Research Vessel, R/V David Johnston, during September 1986. Samples were collected at ten stations (Table 1). Exact locations of these stations were selected so that they could be easily relocated with radar and navigational aids (channel markers and other permanent structures).

Table 1.--Stations sampled for benthic macrofauna

(Samples were collected with a modified Van Veen sampler at all locations. An asterisk (*) indicates stations were an additional sample was collected with a box core.)

Station Name		Latitude North	Longitude West
Berkeley	*	37°52.43′	122°21.20′
Coyote Point	*	37°36.30′	122°18.65
Grizzly Bay	*	38°06.97′	122°02.33′
Hunters Point		37°41.88′	122°22.42′
Palo Alto Inshore		37°27.80′	122°04.90′
Palo Alto Offshore	*	37°28.23′	122°04.38′
San Leandro	*	37°39.57′	122°14.17′
San Pablo Shallow	*	38°03.75′	122°24.40′
San Pablo Status and Trends (S&T)		38°03.00′	122°17.00′
South Bay Deep	*	37°41.20′	122°19.28′

All ten stations were sampled with a modified Van Veen bottom sampler, which sampled an area of approximately 0.05 m^2. Each sample was inspected visually through a hatch in the top of the sampler to assure that the sampler landed squarely on the substrate and penetrated about 10cm. Five replicates were collected at six stations. Ten replicates were collected at the South Bay Deep and San Pablo Shallow stations, and three replicates were collected at the Hunters Point and San Pablo S&T stations.

A single box core sample was obtained at seven of the stations (area of approximately 0.06 m^2). Six of these samples were separated into an upper 10-cm sample and a deeper sample. Penetration of the box core at the San Leandro station was limited to 15cm due to the abundance of relict shell material, so the sample was not split.

All benthic samples were washed on a 0.5 mm-mesh screen to remove fine sediment. Macrofauna and debris were transferred to plastic jars and preserved with a buffered formalin solution (10 percent). After 4 to 7 days, samples were washed to remove the formalin solution, then transferred to 70 percent ethyl alcohol solution. Kinnetic Laboratories, Inc. of Carlsbad, California, was contracted to provide identifications and counts of macrofaunal species. Identifications were made to the species level or the lowest possible taxon. U.S. Geological Survey experts in the field of benthic ecology, Janet Thompson and Frederic Nichols, provided a final check on the quality of the benthic macrofauna data.

BENTHIC MACROFAUNA DATA

Identifications of benthic macrofauna to the lowest possible taxon, usually genus and species, are shown in Table 2 (modified Van Veen) and Table 3 (box core). A summary of the data from Table 2 is presented in Table 4. The cumulative number of species collected with respect to the number of replicates (modified Van Veen) is shown in Table 5.

The cost of analysis is a major factor limiting the number of replicate samples collected in a study of benthic macrofauna. However, data might not be useful for parametric statistical testing unless a sufficient number of replicates are collected to ensure against both type I and type II errors (Green, 1979). Replicate sampling also increases the certainty that most of the components of the benthic communities are represented and that their abundances can be estimated with adequate accuracy. Replication on the order of three to five replicates was recommended by the Technical Advisory Committee, but additional replicates were collected at two stations during this study to determine what information would be gained with a larger number of replicates. Ten replicates were collected at the South Bay Deep and San Pablo Shallow stations, two locations that were biologically diverse, yet different in environmental characteristics. The South Bay Deep station was located in an area where salinity typically is higher and sediment grain sizes are coarser than at the San Pablo Shallow station.

Overview of Species and Numbers Data

Identification of benthic macrofauna to the species level is necessary for the characterization of the community structure and for the calculation of some indices. For a variety of reasons, it is inevitable that some specimens will not be identifiable to the species level. An average of 88 percent of the individuals in the samples collected with a modified Van Veen sampler were identified to the species level. This fraction ranged from 54 percent at Hunters Point to over 98 percent at the Berkeley, Palo Alto Inshore, South Bay Deep, and San Pablo Shallow stations. The four stations showed high percentages in part because of dominance by one or two species. Ampelisca abdita represented 82 to 89 percent of the individuals at the Berkeley, South Bay Deep, and San Pablo Shallow stations, and two species, Gemma gemma and Ampelisca abdita, represented 89 percent of the individuals at the Palo Alto Inshore station. A high percentage also was observed at the Palo Alto Offshore station (97 percent), but Ampelsica abdita, the most abundant species, represented only 37 percent of the individuals. In general, the fraction of the species identified was lowest when nematodes or oligochaetes or both were present in the samples, particularly at the Coyote Point (61 percent) and San Leandro (86 percent) stations. An average of 93 percent of the individuals were identified to the species level at the Grizzly Bay and San Pablo Status and Trends stations.

The cumulative numbers of species collected with respect to the number of replicates are presented in Table 5. Five or more replicates were collected at eight stations. Relative to the total number of species collected in the first five replicates at these eight stations, an average of 90 percent of the species were collected in the three replicates, and an average of 96 percent were collected in four replicates. The lowest percentage for three replicates was 78 percent at the San Pablo Shallow station, and the lowest for four replicates was 87 percent at the Berkeley station. Most of the species that exhibited moderate to high abundances were present in all replicates. All of the species that were collected only in the fourth or fifth replicate or both were present in numbers of only one or two specimens in the total of five replicates. Similarly, at the two stations where ten replicates were collected, abundances of all species collected only in the fourth through tenth replicates were less than an average of one specimen per replicate. Relative to the total numbers of species collected in ten replicates, 92 and 84 percent of these were collected by the fifth replicate at the San Pablo Shallow and South Bay Deep stations, respectively.

Comparison of the Palo Alto Offshore and Palo Alto Inshore Stations

Both Palo Alto stations were located in an area where the substrate is exposed during the lowest tides. The Palo Alto Offshore station is adjacent to the deep channel, which facilitates access to the station relative to the Palo Alto Inshore station, which is closer to a transect of intertidal stations with a ten-year record of benthic macrofauna data. Criteria for selection of a Palo Alto station included the number of species which were dominant components and the abundances of these species.

A major difference was observed in the abundance of the small clam, Gemma Gemma, between the two stations. Thousands of these clams were collected in each sample at the Palo Alto Inshore station, whereas few were found at the Palo Alto Offshore station. In addition, densities of the second- through ninth-ranked (by mean abundance) species at the Palo Alto Inshore station were higher than their densities at the Palo Alto Offshore station by factors of about two to four. The abundance of Gemma gemma, an important feature in this region of the estuary (Thompson, 1979 and 1982), and the greater abundances of dominant components of the benthic community gave preference to the Palo Alto Inshore station for long-term monitoring.

Comparison of the Coyote Point and Hunters Point Stations

Although the Hunters Point station is sampled annually by the NOAA Status and Trends program, an alternative site for a west-side, shallow-water station, the Coyote Point station, was located farther from areas known to be contaminated by toxic substances (Long and others, 1988). The first-ranked (by abundance) species at the Coyote Point station was present at the Hunters Point station in about one-half the density. Second- and third-ranked species at the Coyote Point station were present in about the same abundance at the Hunters Point station. The fourth- through eight-ranked species at the Coyote Point station were present in much lower numbers or absent at the Hunters Point station. The Coyote Point station was preferred over the Hunters Point station for long-term monitoring because the Hunters Point station was closer to known sources of toxic contaminants. In addition, there were more species and they were present in greater abundances at the Coyote Point station.

Evaluation of the San Pablo Status and Trends Station

Deep-water areas of San Pablo Bay are dynamic environments. Resulting changes in the substrate texture and material might prove unsuitable for long-term monitoring. The NOAA Status and Trends program samples a location seaward of Carquinez Strait near the mouth of the Napa River in San Pablo Bay. Three replicates were collected at this location during our study to evaluate the potential of this site for long-term monitoring. The station was at an intermediate depth between the dredged channel and the adjacent shoals to the south.

Relatively few species were collected, and all but Mya arenaria were present in low numbers. Numbers of Mya arenaria varied greatly among the replicates. These results indicated that alternative sites in the deep-water areas of San Pablo Bay should be investigated.

Evaluation of Box Core Results

Box core samplers commonly are preferred for benthic monitoring programs that operate in coastal marine environments. In a shallow estuary, where smaller vessels must be utilized, box core samplers can be much more hazardous to use than the modified Van Veen sampler. The modified Van Veen sampler collected sediments to a depth of about 10 cm or more at most locations in San Francisco Bay. Comparisons of the upper and lower box core samples at each station indicated what species might be missed by the modified Van Veen sampler.

In general, the upper layer contained more species and a greater number of individuals than were found in the lower layer (Table 3). With the notable exception of the polychaete, Asychis elongata, in some cases, most species that were present in the lower layer were abundant in much greater numbers in the upper layer of each box core. Other exceptions involved very few individuals.

At the San Leandro station, the box core penetrated deeper than the modified Van Veen sampler (see Methods). In spite of this, results from the box core fell within the ranges of the results from the modified Van Veen sampler, and no major differences in species were found. These results and those mentioned above suggest that the modified Van Veen sampler should be acceptable for this study in San Francisco Bay.

ADDITIONAL STUDIES

Seven stations were tentatively accepted on the basis of the proximity of known sources of toxic contaminants, the numbers of species and numbers of individuals data, and ability to be sampled with a modified Van Veen sampler. These stations were sampled at two-month intervals beginning in March 1986, as part of the Regional Effects Monitoring program (Schemel and others, 1988 and 1989). This program documented the introduction of the Asian clam Potamocorbula amurensis. This invader became numerically dominant in the benthic macrofauna very quickly after its introduction (Carlton and others 1990), and caused major changes in benthic macrofauna communities (Nichols and others, 1990). Data from the September 1986 study provide background information about benthic macrofauna community structure before invasion by the Asian clam.

Data from the large number of replicates collected during this study provide information useful for planning future monitoring studies in San Francisco Bay. This benthic macrofauna data set was the first such data for San Francisco Bay made available on the U.S. Environmental Protection Agency Ocean Data Evaluation System (ODES). These data were analyzed in a more thorough manner by statistical tools in the ODES environment (Tetra Tech, Inc., 1990).

SUMMARY

Benthic macrofauna were collected during September 1986 as part of an evaluation of stations for long-term monitoring in the U.S. Geological Survey Regional Effects Monitoring Program in San Francisco Bay, California. Three to ten replicate samples were collected with a modified Van Veen sampler at ten locations. One box core sample was collected at seven of the ten locations. Six of the box core samples were split into an upper 10 cm sample and a deeper sample before analysis. Macrofauna specimens were identified to the lowest possible taxon, then counted.

An average of 88 percent of the benthic macrofauna specimens were identified to the species level. The fraction varied among stations from 54 to 98 percent. Nematodes and oligochaetes accounted for most of the unidentified specimens. Relative to the total number of species identified in five replicates, an average of 90 percent of the species were collected with three replicates. In general, species with high to moderate abundances were present in all replicates, and species collected only after three or more replicates averaged less than one specimen per replicate. Replication on the order of three samples appeared adequate for describing dominant components of the benthic macrofauna communities, but additional replicates might be needed to resolve trends over time if small-scale spatial, seasonal, and interannual variability is great.

Results from the box cores showed that most species were most abundant in the upper 10 cm, the layer that can be adequately sampled with a modified Van Veen sampler.

On the basis of the number of species and their abundances at each location, seven of the ten locations were selected for sampling in the regular program which began in March 1987. An acceptable location in the deep water areas of San Pablo Bay was not identified.

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Table 2.--Benthic macrofauna data from modified Van Veen Sampler--

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 1	2	3	4	5
Berkeley Station						
Sampling date: September 18, 1986						
Ampelisca abdita	5275504	624	303	685	533	333
Asychis elongata	4810565	1	0	0	0	0
Capitella capitata	4810241	3	0	3	3	2
Cooperella subdiaphana	5540056	1	0	0	0	0
Cryptomya californica	5540155	0	0	0	0	1
Edwardsia sipunculoides	3730022	0	1	0	1	0
Edwardsiidae, unident.	3730045	0	1	1	0	0
Glycinde polygnatha	4810496	17	19	14	8	19
Grandidierella japonica	5275503	1	5	1	1	1
Harmothoe imbricata	4810343	3	0	3	2	0
Leptochelia dubia	5264038	0	2	0	0	0
Modiolus sp(p).	5540409	1	2	1	0	0
Musculista senhousia	5540401	0	2	2	1	0
Mya arenaria	5540402	0	1	0	0	0
Mytilus edulis	5540024	0	2	0	0	0
Nephtys cornuta franciscana	4810116	0	0	1	0	0
Nephtys ferruginea	4810706	0	0	0	0	2
Oligochaete, unident.	4880001	3	0	11	5	0
Pherusa sp(p).	4810935	0	0	0	1	0
Phoronis sp(p).	5700002	0	0	0	14	4
Protothaca staminea	5540035	1	3	0	0	0
Pseudopolydora kempi	4810640	0	1	1	0	1
Pseudopolydora paucibranchiata	4810347	3	1	2	1	2
Sarsiella zostericola	5220091	10	3	1	5	2
Scolanthus sp. A	3730047	1	0	0	0	0
Sphaerosyllis californiensis	4810272	2	3	0	0	0
Synidotea laticauda	5265110	0	0	0	0	2
Tapes japonica	5540158	1	0	0	0	1

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 1	2	3	4	5
Coyote Point Station						
Sampling date: September 17, 1986						
Ampelisca abdita	5275504	35	104	78	50	40
Ampithoe valida	5275012	0	0	1	2	1
Anthozoan, unident.	3730010	9	3	5	8	4
Asychis elongata	4810565	1	0	5	1	3
Capitella capitata	4810241	24	18	3	16	21
Caprella scaura	5275508	2	5	5	2	8
Caprellids, unident.	5275102	0	0	0	1	0
Corophium sp(p).	5275098	2	0	0	2	0
Corymorpha sp(p).	3710048	0	1	0	2	0
Cryptomya californica	5540155	0	0	1	0	0
Eteone californica	4810573	0	4	0	4	2
Gemma gemma	5540400	0	0	2	0	0
Glycinde polygnatha	4810496	12	14	5	17	9
Grandidierella japonica	5275503	44	111	70	87	71
Harmothoe imbricata	4810343	3	6	2	15	3
Heteromastus filiformis	4810438	19	11	13	11	14
Macoma balthica	5540147	0	0	0	0	2
Macoma indentata	5540176	1	1	0	0	0
Macoma sp(p).	5540105	0	0	1	0	0
Marphysa sanguinea	4810248	1	1	0	2	0
Molgula manhattensis	6301075	16	30	43	83	75
Musculista senhousia	5540401	25	28	21	42	36
Neanthes succinea	4810562	1	0	0	0	0
Nematodes, unident.	4500001	92	85	33	123	75
Nephtys cornuta franciscana	4810116	0	0	0	0	1
Oligochaete, unident.	4880001	229	132	66	206	87
Platyhelminthid, unident.	3900001	0	1	0	0	1
Polydora ligni	4810168	5	10	4	11	4
Pseudopolydora kempi	4810640	8	9	2	3	11
Pseudopolydora paucibranchiata	4810347	13	10	3	10	11
Sarsiella zostericola	5220091	43	57	103	73	56
Sphaerosyllis bilobata	4810833	2	14	1	11	3
Sphaerosyllis californiensis	4810272	10	9	13	20	10
Streblospio benedicti	4810257	0	1	0	0	0
Synidotea laticauda	5265110	0	0	0	1	0
Tapes japonica	5540158	12	9	10	7	12
Theora lubrica	5540114	0	0	3	0	0

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 1	2	3	4	5
Grizzly Bay Station						
Sampling date: September 18, 1986						
Ampelisca abdita	5275504	0	0	2	1	0
Balanus improvisus	5250020	0	145	60	0	105
Boccardiella ligerica	4810831	4	205	196	190	45
Capitellidae, unident.	4810558	0	0	1	0	0
Corbicula manilensis	5540196	4	0	2	0	0
Corophium sp(p).	5275098	0	1	2	0	6
Eteone lighti	4810041	0	4	7	5	1
Glycinde polygnatha	4810496	0	0	0	1	0
Grandidierella japonica	5275503	0	15	7	0	1
Leucon subnasica	5263012	35	7	5	10	19
Melita nitida	5275278	0	2	0	0	0
Mya arenaria	5540402	0	1	0	0	0
Neanthes succinea	4810562	0	3	1	2	0
Oligochaete, unident.	4880001	7	12	10	18	5
Pleusymtes sp(p).	5275203	0	2	0	0	2
Rhithropanopeus harrisii	5286504	0	1	0	0	0
Synidotea laticauda	5265110	0	1	2	0	2
Palo Alto Inshore Station						
Sampling date: September 22, 1986						
Ampelisca abdita	5275504	639	645	560	398	561
Ampharetid, unident.	4810977	0	0	1	0	0
Balanus improvisus	5250020	0	3	15	8	8
Corophium sp(p).	5275098	0	4	0	3	5
Diadumene leucolena	3730021	0	0	1	0	0
Eteone lighti	4810041	3	2	6	2	4
Gemma gemma	5540400	4425	2823	3126	2355	3356
Grandidierella japonica	5275503	20	16	13	10	10
Harmothoe imbricata	4810343	1	2	0	0	0
Heteromastus filiformis	4810438	140	116	108	79	126
Macoma balthica	5540147	6	4	4	2	2
Musculista senhousia	5540401	7	7	9	11	6
Mya arenaria	5540402	11	5	8	8	11
Nassarius obsoletus	5570304	1	0	0	0	0
Neanthes succinea	4810562	15	14	10	6	18
Nematodes, unident.	4500001	1	0	0	0	0
Odostomia (Evalea) sp. J (Shrake)	5570305	11	0	27	10	1
Odostomia (Menestho) sp. I	5570306	24	2	36	19	4
Oligochaete, unident.	4880001	2	0	7	0	0
Platyhelminthid, unident.	3900001	0	0	1	0	0
Polychaeta, unident.	4810276	0	0	0	0	3

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 1	2	3	4	5
Palo Alto Inshore Station						
Sampling date: September 22, 1986--Continued						
Polydora ligni	4810168	3	15	2	5	0
Pseudopolydora kempi	4810640	1	1	0	0	0
Sarsiella zostericola	5220091	128	195	192	122	182
Spionidae, unident.	4810988	0	1	0	0	0
Streblospio benedicti	4810257	89	64	94	51	78
Synidotea laticauda	5265110	1	3	2	1	5
Tapes japonica	5540158	0	1	1	0	0
Tharyx sp(p).	4810319	1	0	0	0	0
San Leandro Station						
Sampling date: September 17, 1986						
Ampelisca abdita	5275504	679	99	171	477	694
Anthozoan, unident.	3730010	0	14	0	11	1
Asychis elongata	4810565	1	1	2	3	3
Campanularidae, unident.	3710039	1	1	0	0	0
Cancer jordani	5286515	0	1	0	0	0
Capitella capitata	4810241	1	0	0	1	3
Capitellidae, unident.	4810558	0	0	0	2	0
Caprella scaura	5275508	0	1	0	0	0
Caprella sp(p).	5275117	0	2	0	0	0
Cheilostomata unident.	5600177	1	1	1	1	1
Corophium sp(p).	5275098	70	41	25	29	62
Corymorpha sp(p).	3710048	0	0	1	0	0
Crassostraea virginica	5540195	0	0	0	1	0
Crepidula sp(p).	5570203	7	20	18	9	6
Cumella vulgaris	5263098	1	0	0	1	1
Eteone californica	4810573	0	6	1	1	1
Eteone lighti	4810041	0	1	0	0	0
Euchone limnicola	4810255	0	0	1	0	0
Glycinde polygnatha	4810496	8	11	10	8	9
Grandidierella japonica	5275503	24	19	42	32	40
Harmothoe imbricata	4810343	6	9	6	2	10
Hemigrapsus oregonensis	5286092	1	1	0	0	0
Heteromastus filiformis	4810438	10	112	19	15	12
Marphysa sanguinea	4810248	7	19	5	6	9
Molgula manhattensis	6301075	1	5	1	2	3
Musculista senhousia	5540401	50	283	13	37	41
Nematodes, unident.	4500001	23	214	0	5	13
Oligochaete, unident.	4880001	46	100	25	27	68
Pagurus sp(p).	5286522	0	0	0	0	1
Platyhelminthid, unident.	3900001	1	1	0	3	0

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 1	2	3	4	5
San Leandro Station						
Sampling date: September 17, 1986--Continued						
Pleusymtes sp(p).	5275203	0	4	1	1	0
Polychaeta, unident.	4810276	0	1	2	0	1
Polydora ligni	4810168	122	498	43	125	180
Pseudopolydora kempi	4810640	24	13	33	32	33
Pseudopolydora paucibranchiata	4810347	3	9	6	9	12
Sarsiella zostericola	5220091	44	34	58	60	89
Scoloplos sp. (juv)	4810742	0	0	0	1	0
Sipuncula, unident.	4900001	0	0	1	0	0
Sphaerosyllis bilobata	4810833	2	7	0	2	3
Sphaerosyllis californiensis	4810272	4	8	0	0	4
Synidotea laticauda	5265110	7	4	7	5	9
Tapes japonica	5540158	26	12	98	26	28
Theora lubrica	5540114	0	0	2	0	0
Urosalpinx cinerea	5570200	0	1	0	0	0
San Pablo Status and Trends Station						
Sampling date: September 18, 1986						
Ampelisca abdita	5275504	2	6	2		
Corophium sp(p).	5275098	0	6	0		
Crustacea, unident.	5290001	3	0	2		
Glycinde polygnatha	4810496	7	6	3		
Grandidierella japonica	5275503	1	10	0		
Heteromastus filiformis	4810438	0	1	3		
Macoma balthica	5540147	0	0	1		
Musculista senhousia	5540401	1	0	0		
Mya arenaria	5540402	78	240	58		
Oligochaete, unident.	4880001	2	4	8		
Pseudopolydora kempi	4810640	2	6	2		
Streblospio benedicti	4810257	0	4	0		
Synidotea laticauda	5265110	0	3	1		

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 1	2	3	4	5
San Pablo Shallow Station						
Sampling date: September 18, 1986						
Ampelisca abdita	5275504	733	1018	1048	1240	1199
Asychis elongata	4810565	0	0	0	0	0
Bowerbankia gracilis	5600009	0	0	0	0	1
Corophium sp(p).	5275098	0	3	3	3	0
Crustacea, unident.	5290001	0	0	0	1	0
Gemma gemma	5540400	0	9	0	12	1
Glycinde polygnatha	4810496	8	10	11	10	8
Grandidierella japonica	5275503	7	4	10	9	8
Harmothoe imbricata	4810343	0	1	1	0	0
Heteromastus filiformis	4810438	3	1	0	1	2
Leptochelia dubia	5264038	1	0	0	0	0
Leucon subnasica	5263012	1	0	0	1	0
Macoma balthica	5540147	0	0	1	1	1
Musculista senhousia	5540401	0	1	2	0	1
Mya arenaria	5540402	138	138	148	158	157
Mytilus edulis	5540024	0	0	0	1	0
Neanthes succinea	4810562	1	2	0	1	1
Nematodes, unident.	4500001	0	0	0	2	4
Odostomia (Evalea) sp. I (Shrake)	5570317	0	0	0	0	0
Odostomia (Evalea) sp. J (Shrake)	5570305	0	0	0	0	2
Odostomia (Menestho) sp. I	5570306	0	0	0	2	0
Oligochaete, unident.	4880001	6	1	6	12	25
Pelecypod, unident.	5540002	1	0	0	1	0
Phoronis sp(p).	5700002	0	0	1	0	0
Pseudopolydora kempi	4810640	0	3	1	5	1
Pseudopolydora paucibranchiata	4810347	0	1	0	0	0
Sarsiella zostericola	5220091	0	0	1	0	5
Spionidae, unident.	4810988	1	0	0	0	0
Streblospio benedicti	4810257	1	2	5	9	6
Synidotea laticauda	5265110	4	2	2	3	0
Tapes japonica	5540158	0	1	2	1	0
Theora lubrica	5540114	0	0	0	1	0

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 6	7	8	9	10
	San Pablo Shallow Station					
	Sampling date: September 18, 1986					
Ampelisca abdita	5275504	969	928	810	1039	886
Asychis elongata	4810565	0	0	0	1	0
Bowerbankia gracilis	5600009	0	0	0	0	0
Corophium sp(p).	5275098	0	1	1	1	2
Crustacea, unident.	5290001	0	0	0	0	0
Gemma gemma	5540400	0	0	0	0	0
Glycinde polygnatha	4810496	10	15	6	8	11
Grandidierella japonica	5275503	11	14	9	9	4
Harmothoe imbricata	4810343	0	0	2	0	0
Heteromastus filiformis	4810438	2	0	1	0	1
Leptochelia dubia	5264038	0	0	0	0	0
Leucon subnasica	5263012	0	0	1	0	0
Macoma balthica	5540147	0	0	0	0	0
Musculista senhousia	5540401	1	0	0	0	0
Mya arenaria	5540402	147	155	118	98	163
Mytilus edulis	5540024	0	0	0	0	0
Neanthes succinea	4810562	0	0	1	1	0
Nematodes, unident.	4500001	0	0	0	1	0
Odostomia (Evalea) sp. I (Shrake)	5570317	1	0	3	0	1
Odostomia (Evalea) sp. J (Shrake)	5570305	0	0	1	0	0
Odostomia (Menestho) sp. I	5570306	0	0	0	0	0
Oligochaete, unident.	4880001	8	6	22	30	8
Pelecypod, unident.	5540002	0	0	0	0	0
Phoronis sp(p).	5700002	0	2	0	0	0
Pseudopolydora kempi	4810640	3	1	0	7	1
Pseudopolydora paucibranchiata	4810347	0	0	0	0	0
Sarsiella zostericola	5220091	0	1	0	0	0
Spionidae, unident.	4810988	0	0	0	0	0
Streblospio benedicti	4810257	4	2	9	10	3
Synidotea laticauda	5265110	1	2	3	4	2
Tapes japonica	5540158	4	2	3	1	1
Theora lubrica	5540114	0	0	0	2	0

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 1	2	3	4	5
South Bay Deep Station						
Sampling date: September 17, 1986						
Acmira catherinae	4810671	1	0	0	0	0
Alvania sp(p).	5570181	0	1	0	0	0
Ampelisca abdita	5275504	558	905	568	656	435
Amphiurid, unident.	5930014	0	0	1	0	0
Anthozoan, unident.	3730010	9	4	2	8	0
Asychis elongata	4810565	49	39	38	18	34
Callianassa sp(p).	5286521	0	0	0	0	0
Capitella capitata	4810241	0	3	2	0	1
Capitellidae, unident.	4810558	0	0	0	0	0
Cirratulidae, unident.	4810990	0	0	0	0	0
Corophium sp(p).	5275098	2	3	0	0	0
Cossura pygodactylata	4810861	0	0	0	0	0
Crepidula sp(p).	5570203	0	0	0	0	0
Cryptomya californica	5540155	0	0	1	2	0
Diadumene leucolena	3730021	0	0	0	1	1
Edwardsiidae, unident.	3730045	0	2	0	0	2
Epitonium sp(p).	5570197	0	0	0	0	0
Euchone limnicola	4810255	2	0	0	1	1
Eudorella pacifica	5263112	0	1	0	1	0
Exogone lourei	4810066	8	7	4	8	1
Gemma gemma	5540400	0	2	0	0	0
Glycera robusta	4810532	0	0	0	1	0
Glycera sp(p).	4810079	0	0	0	0	0
Glycinde polygnatha	4810496	6	10	12	11	7
Grandidierella japonica	5275503	0	0	0	0	0
Harmothoe imbricata	4810343	2	3	1	2	0
Heteromastus filiformis	4810438	0	0	0	0	0
Leptochelia dubia	5264038	1	5	3	2	1
Lineidae, unident	4000038	0	1	1	0	2
Mediomastus sp.	4810303	0	0	0	0	0
Mediomastus sp(p).	4810598	1	2	2	4	0
Molgula manhattensis	6301075	12	5	8	5	0
Monostylifera	4000058	0	0	0	0	1
Musculista senhousia	5540401	3	4	8	5	7
Mya arenaria	5540402	1	0	0	0	0
Nematodes, unident.	4500001	1	2	0	0	1
Nemertea, unident.	4000002	0	0	0	0	0
Nephtys caecoides	4810114	0	0	0	1	0
Nephtys californiensis	4810115	1	2	1	0	0
Nephtys cornuta franciscana	4810116	2	2	0	4	1
Notomastus sp.	4810389	0	0	0	0	0
Notomastus tenuis	4810125	1	0	0	0	0
Nudibranchia, unident.	5570976	0	0	0	0	0

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 1	2	3	4	5
		South Bay Deep Station				
		Sampling date: September 17, 1986--Continued				
Oligochaete, unident.	4880001	1	0	0	0	0
Pholoides aspera	4810570	1	0	0	0	1
Phoronis sp(p).	5700002	0	1	7	0	0
Pleusymtes sp(p).	5275203	0	1	0	0	0
Polydora brachycephala	4810557	1	0	0	0	0
Polydora ligni	4810168	0	0	0	0	0
Polydora socialis	4810940	1	0	2	0	0
Pseudopolydora paucibranchiata	4810347	0	0	0	0	0
Pyromaia tuberculata	5286094	0	0	0	0	0
Sarsiella zostericola	5220091	17	32	19	17	11
Schistomeringos rudolphi	4810354	1	2	1	2	0
Stylatula sp(p).	3730044	0	1	0	0	0
Synidotea laticauda	5265110	1	2	2	0	0
Tapes japonica	5540158	9	8	7	9	8
Theora lubrica	5540114	0	1	0	0	0
Tubulanus polymorphus	4000035	1	0	0	0	0
Tubulanus sp(p).	4000013	0	0	0	0	0

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 6	7	8	9	10
	South Bay Deep Station					
	Sampling date: September 17, 1986					
Acmira catherinae	4810671	0	0	0	0	0
Alvania sp(p).	5570181	0	0	0	0	0
Ampelisca abdita	5275504	621	864	632	592	512
Amphiurid, unident.	5930014	0	0	0	0	0
Anthozoan, unident.	3730010	7	7	6	17	3
Asychis elongata	4810565	9	11	17	30	22
Callianassa sp(p).	5286521	0	0	0	1	0
Capitella capitata	4810241	0	0	0	0	0
Capitellidae, unident.	4810558	0	0	1	0	0
Cirratulidae, unident.	4810990	0	0	0	1	0
Corophium sp(p).	5275098	1	0	0	2	0
Cossura pygodactylata	4810861	0	2	1	0	1
Crepidula sp(p).	5570203	0	0	0	1	0
Cryptomya californica	5540155	0	0	0	0	0
Diadumene leucolena	3730021	0	0	0	0	0
Edwardsiidae, unident.	3730021	0	0	0	0	0
Epitonium sp(p).	5570197	0	1	0	0	0
Euchone limnicola	4810255	0	0	0	1	1
Eudorella pacifica	5263112	0	0	1	1	0
Exogone lourei	4810066	19	49	51	28	11
Gemma gemma	5540400	0	0	0	0	0
Glycera robusta	4810532	0	0	0	0	0
Glycera sp(p).	4810079	0	0	0	0	1
Glycinde polygnatha	4810496	15	10	5	7	6
Grandidierella japonica	5275503	0	0	2	1	0
Harmothoe imbricata	4810343	3	2	2	1	3
Heteromastus filiformis	4810438	4	0	2	2	0
Leptochelia dubia	5264038	4	4	2	6	4
Lineidae, unident	4000038	0	0	0	1	0
Mediomastus sp.	4810303	0	0	4	3	0
Mediomastus sp(p).	4810598	0	0	0	0	0
Molgula manhattensis	6301075	8	18	8	21	1
Monostylifera	4000058	0	0	0	0	0
Musculista senhousia	5540401	9	11	8	8	6
Mya arenaria	5540402	0	0	0	0	0
Nematodes, unident.	4500001	5	3	5	7	0
Nemertea, unident.	4000002	0	0	0	0	1
Nephtys caecoides	4810114	0	0	0	0	1
Nephtys californiensis	4810115	0	0	0	0	0
Nephtys cornuta franciscana	4810116	2	1	0	3	2
Notomastus sp.	4810389	0	0	0	0	1
Notomastus tenuis	4810125	0	0	0	0	0
Nudibranchia, unident.	5570976	0	2	0	1	0

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 6	7	8	9	10
South Bay Deep Station						
Sampling date: September 17, 1986--Continued						
Oligochaete, unident.	4880001	0	0	1	0	0
Pholoides aspera	4810570	0	0	0	0	0
Phoronis sp(p).	5700002	0	0	2	0	0
Pleusymtes sp(p).	5275203	1	0	0	7	0
Polydora brachycephala	4810557	1	0	0	1	0
Polydora ligni	4810168	0	1	3	0	0
Polydora socialis	4810940	0	0	0	0	0
Pseudopolydora paucibranchiata	4810347	1	0	0	0	0
Pyromaia tuberculata	5286094	0	1	0	0	0
Sarsiella zostericola	5220091	12	28	20	20	20
Schistomeringos rudolphi	4810354	2	0	3	6	2
Stylatula sp(p).	3730044	0	0	1	0	0
Synidotea laticauda	5265110	2	2	2	4	1
Tapes japonica	5540158	18	8	7	17	23
Theora lubrica	5540114	0	0	0	0	0
Tubulanus polymorphus	4000035	0	0	0	0	0
Tubulanus sp(p).	4000013	0	0	1	0	0

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 1	2	3	4	5
Hunters Point Station						
Sampling date: September 17, 1986						
Ampelisca abdita	5275504	67	71	40		
Anthozoan, unident.	3730010	0	0	1		
Asychis elongata	4810565	3	4	3		
Capitella capitata	4810241	2	3	2		
Corophium sp(p).	5275098	0	0	2		
Cryptomya californica	5540155	2	0	0		
Edwardsiidae, unident.	3730045	1	0	2		
Euchone limnicola	4810255	0	3	0		
Exogone lourei	4810066	0	3	4		
Gemma gemma	5540400	0	0	1		
Glycinde polygnatha	4810496	15	16	9		
Grandidierella japonica	5275503	20	60	23		
Harmothoe imbricata	4810343	0	3	1		
Heteromastus filiformis	4810438	1	0	0		
Macoma balthica	5540147	1	0	0		
Macoma sp(p).	5540105	1	0	0		
Molgula manhattensis	6301075	0	0	3		
Musculista senhousia	5540401	1	4	1		
Mya arenaria	5540402	3	4	2		
Neanthes succinea	4810562	0	0	1		
Nephtys caecoides	4810114	1	1	3		
Nephtys cornuta franciscana	4810116	2	1	2		
Oligochaete, unident.	4880001	0	2	7		
Phoronis sp(p).	5700002	170	991	2		
Polydora ligni	4810168	0	1	0		
Pseudopolydora kempi	4810640	1	2	1		
Pseudopolydora paucibranchiata	4810347	2	2	11		
Sarsiella sp(p).	5220071	0	1	0		
Sarsiella zostericola	5220091	46	31	85		
Spionidae, unident.	4810988	2	0	0		
Stylatula sp(p).	3730044	0	0	3		
Tapes japonica	5540158	10	15	13		
Tenonia priops	4810727	1	0	0		
Theora lubrica	5540114	1	0	1		
Tubularia sp(p).	3710015	0	0	4		
Veneroid, unident.	5540141	0	1	0		

Table 2.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Individuals, Replicate number 1	2	3	4	5
Palo Alto Offshore Station						
Sampling date: September 22, 1986						
Ampelisca abdita	5275504	158	140	218	145	161
Asychis elongata	4810565	1	2	0	1	2
Bivalvia, unid.	5540210	0	0	0	0	1
Cirratulidae, unident.	4810990	0	0	1	0	1
Corophium sp(p).	5275098	4	7	14	1	4
Eteone lighti	4810041	0	0	0	1	0
Gemma gemma	5540400	9	1	7	1	1
Glycinde polygnatha	4810496	1	0	0	2	2
Grandidierella japonica	5275503	18	17	0	3	10
Heteromastus filiformis	4810438	56	104	95	97	42
Macoma balthica	5540147	0	1	0	0	0
Marphysa sanguinea	4810248	0	1	5	0	2
Musculista senhousia	5540401	4	9	12	5	9
Mya arenaria	5540402	2	1	6	0	3
Neanthes succinea	4810562	5	8	6	10	4
Nematodes, unident.	4500001	0	0	1	0	0
Odostomia (Evalea) sp. I (Shrake)	5570317	5	0	0	0	2
Odostomia (Evalea) sp. J (Shrake)	5570305	2	5	12	0	4
Oligochaete, unident.	4880001	2	2	7	6	4
Platyhelminthid, unident.	3900001	0	0	1	0	0
Pleusymtes sp(p).	5275203	0	1	0	0	1
Polydora ligni	4810168	0	0	2	0	0
Pseudopolydora kempi	4810640	3	3	4	4	3
Pseudopolydora paucibranchiata	4810347	0	1	5	2	0
Sarsiella zostericola	5220091	86	95	76	112	77
Sphaerosyllis bilobata	4810833	0	0	1	0	0
Streblospio benedicti	4810257	17	19	79	75	64
Synidotea laticauda	5265110	1	2	6	0	0
Tapes japonica	5540158	3	3	3	1	4
Theora lubrica	5540114	0	0	0	0	2
Urosalpinx cinerea	5570200	2	0	9	0	0

Table 3.--Benthic macrofauna data from box core sampler--

Taxonomic entry	Kinnetic Laboratory code	Number of individuals
RESULTS FROM 0.06 SQUARE METER BOX CORE SAMPLES: September 1986		
BERKELEY STATION: LOWER		
Ampelisca abdita	5275504	18
Sarsiella zostericola	5220091	1
Mya arenaria	5540402	1
Tapes japonica	5540158	1
Lineidae, unident	4000038	3
Paranemertes sp(p).	4000050	95
Asychis elongata	4810565	4
Capitella capitata	4810241	6
Glycinde picta	4810420	1
Harmothoinae, unident.	4810459	1
Heteromastus filiformis	4810438	1
Mediomastus sp(p).	4810598	1
Prionospio lighti	4810549	1
Scolelepis squamata	4810589	1
BERKELEY STATION: UPPER		
Ampelisca abdita	5275504	734
Cancer jordani	5286515	2
Grandidierella japonica	5275503	5
Leptochelia dubia	5264038	2
Sarsiella zostericola	5220091	5
Macoma balthica	5540147	2
Musculista senhousia	5540401	3
Ctenostomate, unident.	5600114	1
Edwardsia sipunculoides	3730022	1
Nematodes, unident.	4500001	1
Oligochaete, unident.	4880001	120
Stylatula sp(p).	3730044	1
Armandia bioculata	4810545	1
Capitella capitata	4810241	6
Euchone limnicola	4810255	1
Exogone lourei	4810066	2
Glycinde armigera	4810374	13
Glycinde picta	4810420	15
Harmothoe imbricata	4810343	3
Pseudopolydora kempi	4810640	1
Pseudopolydora paucibranchiata	4810347	1
Sphaerosyllis californiensis	4810272	6
Spiophanes sp(p).	4810396	1
Streblospio benedicti	4810257	2

Table 3.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Number of individuals
RESULTS FROM 0.06 SQUARE METER BOX CORE SAMPLES: September 1986		
COYOTE POINT STATION: LOWER		
Tapes japonica	5540158	2
Asychis elongata	4810565	24
Capitella capitata	4810241	1
Capitellidae, unident.	4810558	1
COYOTE POINT STATION: UPPER		
Ampelisca abdita	5275504	38
Corophium sp(p).	5275098	2
Grandidierella japonica	5275503	19
Sarsiella zostericola	5220091	39
Musculista senhousia	5540401	25
Tapes japonica	5540158	3
Corymorpha sp(p).	3710048	1
Molgula manhattensis	6301075	1
Nematodes, unident.	4500001	16
Oligochaete, unident.	4880001	47
Asychis elongata	4810565	5
Capitella capitata	4810241	8
Glycinde armigera	4810374	2
Glycinde picta	4810420	3
Heteromastus filiformis	4810438	3
Polydora ligni	4810168	2
Pseudopolydora kempi	4810640	7
Pseudopolydora paucibranchiata	4810347	14
Sphaerosyllis californiensis	4810272	5
Streblospio benedicti	4810257	1
GRIZZLY BAY STATION: LOWER		
Macoma balthica	5540147	1
Oligochaete, unident.	4880001	3
GRIZZLY BAY STATION: UPPER		
Leucon subnasica	5263012	26
Macoma balthica	5540147	3
Oligochaete, unident.	4880001	14
Boccardiella hamata	4810743	3

Table 3.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Number of individuals
RESULTS FROM 0.06 SQUARE METER BOX CORE SAMPLES: September 1986		
PALO ALTO OFFSHORE STATION: LOWER		
Ampelisca abdita	5275504	1
Synidotea laticauda	5265110	1
Asychis elongata	4810565	1
Heteromastus filiformis	4810438	37
Marphysa sanguinea	4810248	1
Neanthes succinea	4810562	5
Streblospio benedicti	4810257	1
PALO ALTO OFFSHORE STATION: UPPER		
Ampelisca abdita	5275504	200
Corophium sp(p).	5275098	12
Cumella vulgaris	5263098	1
Grandidierella japonica	5275503	21
Sarsiella zostericola	5220091	114
Synidotea laticauda	5265110	2
Gemma gemma	5540400	3
Musculista senhousia	5540401	7
Mya arenaria	5540402	1
Odostomia (Evalea) sp. I (Shrake)	5570317	2
Tapes japonica	5540158	1
Corymorpha sp(p).	3710048	1
Nematodes, unident.	4500001	1
Oligochaete, unident.	4880001	8
Asychis elongata	4810565	4
Capitella capitata	4810241	1
Eteone lighti	4810041	1
Eunicida, unident.	4810567	2
Glycinde picta	4810420	1
Heteromastus filiformis	4810438	90
Neanthes succinea	4810562	5
Polydora ligni	4810168	1
Pseudopolydora kempi	4810640	9
Pseudopolydora paucibranchiata	4810347	6
Streblospio benedicti	4810257	126
Tharyx sp(p).	4810319	1

Table 3.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Number of individuals
RESULTS FROM 0.06 SQUARE METER BOX CORE SAMPLES: September 1986		
SAN LEANDRO STATION: UPPER		
Ampelisca abdita	5275504	192
Caprella scaura	5275508	1
Corophium sp(p).	5275098	26
Grandidierella japonica	5275503	10
Hemigrapsus oregonensis	5286092	1
Pleusymtes sp(p).	5275203	1
Podocopid ostracod	5220092	39
Synidotea laticauda	5265110	4
Musculista senhousia	5540401	72
Tapes japonica	5540158	51
Anthozoan, unident.	3730010	3
Cheilostomata unident.	5600177	1
Nematodes, unident.	4500001	20
Oligochaete, unident.	4880001	21
Platyhelminthid, unident.	3900001	1
Eunicida, unident.	4810567	3
Glycinde armigera	4810374	23
Glycinde picta	4810420	4
Harmothoe imbricata	4810343	13
Heteromastus filiformis	4810438	54
Marphysa sanguinea	4810248	19
Polydora ligni	4810168	33
Polynoid, unident.	4810936	1
Pseudopolydora paucibranchiata	4810347	1

Table 3.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Number of individuals
RESULTS FROM 0.06 SQUARE METER BOX CORE SAMPLES: September 1986		
SAN PABLO SHALLOW STATION: LOWER		
Ampelisca abdita	5275504	4
Cyclopoids copepods, unident.	5230053	5
Upogebia pugettensis	5286103	1
Mya arenaria	5540402	1
SAN PABLO SHALLOW STATION: UPPER		
Ampelisca abdita	5275504	939
Corophium ascherusicum	5275502	1
Corophium sp(p).	5275098	2
Grandidierella japonica	5275503	7
Leucon subnasica	5263012	1
Sarsiella zostericola	5220091	1
Synidotea laticauda	5265110	1
Mya arenaria	5540402	237
Odostomia (Evalea) sp. I (Shrake)	5570317	1
Tapes japonica	5540158	4
Foraminiferans, unident.	3010009	1
Oligochaete, unident.	4880001	8
Glycinde armigera	4810374	13
Glycinde picta	4810420	2
Heteromastus filiformis	4810438	1
Pseudopolydora kempi	4810640	1
Streblospio benedicti	4810257	8

Table 3.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Number of individuals
RESULTS FROM 0.06 SQUARE METER BOX CORE SAMPLES: September 1986		
SOUTH BAY DEEP STATION: LOWER		
Ampelisca abdita	5275504	7
Leptochelia dubia	5264038	1
Sarsiella zostericola	5220091	1
Cryptomya californica	5540155	18
Lineidae, unident	4000038	1
Phoronis sp(p).	5700002	3
Asychis elongata	4810565	22
Capitella capitata	4810241	1
Drilonereis sp(p).	4810424	1
Heteromastus filiformis	4810438	1
Mediomastus sp(p).	4810598	1
Neomediomastus sp(p).	4810865	3
Notomastus sp(p).	4810599	1
SOUTH BAY DEEP STATION: UPPER		
Ampelisca abdita	5275504	854
Callianassa sp(p).	5286521	1
Eudorella pacifica	5263112	10
Pleusymtes sp(p).	5275203	1
Sarsiella zostericola	5220091	16
Synidotea laticauda	5265110	1
Cryptomya californica	5540155	7
Musculista senhousia	5540401	3
Tapes japonica	5540158	14
Yoldia cooperi	5540153	1
Anthozoan, unident.	3730010	4
Edwardsiidae, unident.	3730045	2
Molgula manhattensis	6301075	8
Nematodes, unident.	4500001	3
Phoronis sp(p).	5700002	17
Asychis elongata	4810565	34
Capitella capitata	4810241	2
Cossura pygodactylata	4810861	1
Exogone lourei	4810066	16
Glycinde armigera	4810374	8
Glycinde picta	4810420	2
Harmothoe imbricata	4810343	1
Heteromastus filiformis	4810438	4
Mediomastus sp(p).	4810598	4
Nephtys cornuta franciscana	4810116	3
Nephtys sp(p).	4810579	2
Pholoe glabra	4810442	1

Table 3.--Benthic macrofauna data--Continued

Taxonomic entry	Kinnetic Laboratory code	Number of individuals
RESULTS FROM 0.06 SQUARE METER BOX CORE SAMPLES: September 1986		
SOUTH BAY DEEP STATION: UPPER (Continued)		
Polydora socialis	4810940	1
Schistomeringos rudolphi	4810354	1
Spiophanes berkeleyorum	4810465	1

Table 4.--Summary of benthic macrofauna data

Replicate No.	Taxonomic entries	Species identified	Individuals
		Berkeley Station	
		Sampling date: September 18, 1986	
1	15	13	672
2	15	13	349
3	13	10	726
4	12	9	575
5	12	11	370
Mean number of species identified per sample:		11	
Mean number of individuals per sample:		538	
		Coyote Point Station	
		Sampling date: September 17, 1986	
1	24	20	473
2	25	20	674
3	25	21	493
4	28	22	811
5	25	21	560
Mean number of species identified per sample:		21	
Mean number of individuals per sample:		602	
		Grizzly Bay Station	
		Sampling date: September 18, 1986	
1	4	3	50
2	13	10	399
3	12	9	295
4	7	6	277
5	9	6	186
Mean number of species identified per sample:		7	
Mean number of individuals per sample:		241	
		Palo Alto Inshore Station	
		Sampling date: September 22, 1986	
1	21	18	5529
2	20	18	3923
3	21	18	4235
4	17	16	3090
5	17	15	4380
Mean number of species identified per sample:		17	
Mean number of individuals per sample:		4231	

Table 4.--Summary of benthic macrofauna data--Continued

Replicate No.	Taxonomic entries	Species identified	Individuals
		San Leandro Station	
		Sampling date: September 17, 1986	
1	27	20	1170
2	35	24	1606
3	26	18	592
4	30	20	934
5	28	20	1337
Mean number of species identified per sample:		21	
Mean number of individuals per sample:		1128	
		San Pablo Status and Trends Station	
		Sampling date: September 18, 1986	
1	8	6	96
2	10	8	286
3	9	7	80
Mean number of species identified per sample:		7	
Mean number of individuals per sample:		154	
		San Pablo Shallow Station	
		Sampling date: September 18, 1986	
1	13	10	905
2	16	14	1197
3	15	13	1242
4	21	16	1492
5	16	14	1422
6	12	11	1161
7	12	9	1129
8	15	13	990
9	14	11	1212
10	12	10	1083
Mean number of species identified per sample:		12	
Mean number of individuals per sample:		1183	

Table 4.--Summary of benthic macrofauna data--Continued

Replicate No.	Taxonomic entries	Species identified	Individuals
	South Bay Deep Station		
	Sampling date: September 17, 1986		
1	27	22	693
2	28	18	1051
3	21	16	690
4	20	18	758
5	17	15	515
6	21	17	745
7	19	16	1025
8	25	17	787
9	28	18	800
10	20	16	622
Mean number of species identified per sample:		17	
Mean number of individuals per sample:		769	
	Hunter's Point Station		
	Sampling date: September 17, 1986		
1	22	18	353
2	21	17	1222
3	26	19	227
Mean number of species identified per sample:		18	
Mean number of individuals per sample:		600	
	Palo Alto Offshore Station		
	Sampling date: September 22, 1986		
1	19	17	379
2	20	17	424
3	22	17	571
4	16	14	466
5	22	17	403
Mean number of species identified per sample:		16	
Mean number of individuals per sample:		449	

Table 5.--Cumulative number of species with respect to number of replicates

Replicate number									
1	2	3	4	5	6	7	8	9	10
				Berkeley Station					
13	19	20	20	23	-	-	-	-	-
				Coyote Point Station					
20	22	26	27	29	-	-	-	-	-
				Grizzly Bay Station					
3	11	12	13	13	-	-	-	-	-
				Hunter's Point Station					
18	22	25	-	-	-	-	-	-	-
				Palo Alto Inshore Station					
18	20	21	21	21	-	-	-	-	-
				Palo Alto Offshore Station					
17	20	22	23	24	-	-	-	-	-
				San Leandro Station					
20	25	27	28	28	-	-	-	-	-
				San Pablo Shallow Station					
10	16	18	21	23	24	24	24	25	25
				San Pablo Status and Trends Station					
6	9	10	-	-	-	-	-	-	-
				South Bay Deep Station					
22	27	28	31	32	34	37	38	38	38