TEMPORAL VARIATIONS IN THE BENTHIC COMMUNITIES AT FOUR INTERTIDAL SITES IN SAN FRANCISCO BAY, CALIFORNIA, 1983-85

by Dale R. Hopkins

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For additional information write to:

Regional Hydrologist
Water Resources Division
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CONVERSION FACTORS

Metric units are used in this report. For those readers who prefer to use inch-pound units the conversion factors are given below.

Multiply metric unit	*by*	*To obtain inch-pound unit*
	Length	
millimeter (mm)	0.03937	inch (in.)
centimeter (cm)	0.3937	inch (in.)
meter (m)	3.281	foot (ft)
	Area	
square meter (m^2)	10.76	square foot (ft^2)
	Volume	
cubic meter per second (m^3/s)	35.31	cubic ft per sec. (ft^3/s)

TEMPORAL VARIATIONS IN THE BENTHIC COMMUNITIES AT FOUR INTERTIDAL SITES IN SAN FRANCISCO BAY, CALIFORNIA, 1983-85

by D. R. Hopkins

ABSTRACT

Benthic core samples were collected monthly from January 1983 through January 1985 at four intertidal sites in San Francisco Bay, California, two in the northern part of the bay (North Bay) and two in the southern part of the bay (South Bay). Considerable variation was observed in numbers of species and individuals at the four sites, and abundances within species varied widely. Temporal changes in species abundances appeared to be related to freshwater inflow patterns and resultant salinity variations in the estuary. The 1982-83 winter season was extremely wet, with heavy freshwater inflow to the bay from January through March, whereas the 1983-84 winter was closer to a normal pattern, with most rainfall occurring from November through January.

Species were grouped into four categories depending on their patterns of abundance during the two-year period. Species that showed an abundance peak in the North Bay in 1983 only were *Corophium* sp.B and a Chironomidae larva, apparently responding to the extended period of lowered salinity throughout spring and early summer. Species with an abundance peak only in 1984 included *Corophium acherusicum, Eteone californica, Nereis succinea,* and *Grandidierella japonica*, typical estuarine species that might have been suppressed during the extended freshwater inflows in 1983. Species with peaks in both years were *Gemma gemma* and *Ampelisca abdita* in the South Bay; both showed strong seasonal variations. A number of species in both North and South Bays, including dominant members of the intertidal community such as *Macoma balthica* and *Streblospio benedicti*, did not show any consistent seasonal or year-to-year trends.

Results of this study suggest that the intensity and timing of freshwater inflow to San Francisco Bay, particularly higher-than-normal inflow during late spring and early summer, may be an important factor in determining the composition of the intertidal benthic communities.

INTRODUCTION

Purpose and Scope

Benthic core samples were collected monthly at four sites in San Francisco Bay, California, in conjunction with a 2-year study of growth in the tellinid clam *Macoma balthica* (Thompson and Nichols, 1987). That study was designed to assess the relation between *Macoma* growth rates and *in situ* food supply, using clams implanted monthly in containers at the four sites. The core samples described in this study were initially used to compare growth rates of the natural *Macoma* populations with the implanted specimens. In this report, the same core samples are used to describe the species composition of the benthic community at each of the sites.

This report summarizes the data from the benthic core collections and discusses some of the sampling results in terms of seasonal changes and year-to-year trends. Most benthic studies in San Francisco Bay have been limited to one area of the bay or have involved infrequent sampling (see Nichols, 1973, Hopkins, 1986, for review and listing of benthic studies). Accurate characterization of seasonal changes in the benthic community can be made only with frequent sampling (Nichols, 1985); the monthly samples collected during the present study should be highly useful in such characterization.

Methods

Four upper intertidal mudflat sites in San Francisco Bay (fig. 1) were sampled during this study: two sites in the northern part of the bay (North Bay) and two in the southern (South Bay). Site 1, on the eastern shore of Southampton Bay on Carquinez Strait, is located approximately 10 m from the marsh edge. The second site is near the southeast side of Midshipman Point in San Pablo Bay and is also about 10 m from the edge of the marsh. The third sample site, on the east shore of South Bay at Hayward Landing, is located approximately 8 to 10 m bayward of the ruins of a rock jetty. Site 4 is located near Sand Point, Palo Alto, at the southern end of San Francisco Bay, 12 m from the edge of the marsh. This site is the "station 45" described in the 10-year benthic study of Thompson and Nichols (1984).

Sediment textures, wave and wind exposures, and salinity and temperature regimes throughout the 1983 to 1985 study period are described by Thompson and Nichols (1987). The 1982-83 water year (October 1982 through September 1983) was exceptionally wet (California Department of Water Resources, 1984), with heavy rainfall from late January through March. The 1983-84 water year was classified as an overall "wet" year (California DWR, 1985) because of above-normal rainfall during the months of November and December, though precipition was well below normal for the remaining three quarters. These rainfall patterns were reflected in the rates of freshwater inflow to the bay (fig. 2) and in the salinity levels recorded at or near each sampling site in 1983 and 1984 (fig. 3).

Two rectangular cores, 16.5 x 10 cm and 23 cm deep, were taken at each station, monthly from January 1983 through January 1985, except in February 1983 at the Southampton station and in November 1984 at all stations, when tides and weather conditions did not permit daylight sampling. Samples were washed on a 0.5-mm screen, preserved in formalin for at least 72 hours, stained with rose bengal, and sorted. Animals were identified to species as completely as possible, counted, and stored in 70 percent ethanol.

Acknowledgments

Special thanks are due to F. H. Nichols and J. K. Thompson for their help in collecting the samples, identifying polychaetes and crustaceans respectively, and critical reviews of this paper. My thanks to A. Y. Ota and L. E. Schemel for their manuscript reviews. I would also like to thank A. G.

McHendrie for his help with computer graphics.

BENTHIC ABUNDANCES

Major Species and Total Counts

The major species collected at the four sampling sites are listed in Table 1. "*Corophium* spp." refers to animals that could not be identified either because they had crucial parts missing or because they were females of species that are indistinguishable in existing keys. A number of other taxa listed as "sp." or "spp." were not completely identified because of their very small size (for example, *Cyprideis* sp.) or because taxonomic difficulties prevented specific identifications (Oligochaeta spp., Cirripedia sp., *Boonea* sp., and *Melita* sp.).

There was considerable variation among the sites in species numbers and total counts (tables 2 through 5 and fig. 4). A consistently lower number of species was observed at the North Bay sites, Southampton and San Pablo, with means of 6.7 and 8.0 respectively, than at the South Bay sites, Hayward and Palo Alto, where the mean numbers of species were 11.3 and 13.1. Means for each site were significantly different from all other sites at the 95 percent confidence level. Numbers of individuals were generally higher at the South Bay sites than in the North Bay. The mean number of individuals at Palo Alto, 693/core, was significantly higher ($p < 0.05$) than at the other three stations: Southampton 105/core, San Pablo 139/core, and Hayward, 311/core.

Temporal Patterns of Species Abundance

Patterns of temporal abundances within species varied widely (figs. 5-21). Species responses can be divided into several categories: 1) species that showed an abundance peak in 1983 only, 2) species with an abundance peak only in 1984, 3) species with peaks in both years, and 4) species that did not exhibit clear seasonal or year-to-year trends.

Species that displayed a seasonal peak in 1983 were *Corophium* (figs. 5 and 6) and a Chironomidae larva (fig. 7, tentatively identified as *Paraclunio alaskensis*), which appeared during the late spring and summer of 1983 in North Bay only. The North Bay *Corophium* specimens consisted primarily of an introduced species (J. Chapman, Environmental Protection Agency (EPA), Newport, OR, written commun.; species recognized but as yet unnamed), herein referred to as *Corophium* "sp.B", with a few *C. spinicorne*. Since the abundance peak of *Corophium* spp. [1] (fig. 6) in the North Bay in June 1983 was coincident with that of the introduced *Corophium* sp.B (fig. 5), the unidentifiable individuals were presumed to belong to species "B". The presence of *Corophium* sp.B in large numbers in San Pablo Bay, when it had previously been found only in the Sacramento-San Joaquin delta (J. Chapman, EPA, Newport, OR, oral commun., 1986), apparently reflected the higher-than-normal freshwater inflow and the unusually extended period of lowered salinity (Figs. 2 and 3). The duration of very high inflows into late spring might also explain the appearance of the Chironomidae larvae, which reached a peak of about 250 individuals/core at Southampton in July 1983. Chironomidae are generally found in freshwater areas (Cheeseman and Preissler, 1972), feeding on intertidal diatoms and green algae (Morley and Ring, 1972). It is likely that a combination of freshwater inflow and abundant food supply produced the observed population irruption; the appearance of the larvae also coincided with the presence of a thick microalgal mat on the mud surface in the summer (Thompson and Nichols, 1987).

A second group of species are those that were absent or reduced in numbers in 1983 but showed sharp abundance rises in spring to summer of 1984. The species included *Corophium acherusicum*, *Corophium* spp. [2], and *Grandidierella japonica* (figs. 8-10) in the South Bay, *Nereis succinea* (fig. 11) in the North Bay, and *Eteone californica* (fig. 12) in both North and South Bays. These species, typical of true estuarine habitats (Nichols and Thompson, 1985b), might have been suppressed by the

combination of low salinity and the accompanying high turbidity and siltation of the mudflats during 1983. Abundances increased in 1984 as freshwater inflow decreased and salinity levels returned to a more typical pattern by early spring.

South Bay collections of *Corophium* consisted largely of *C. acherusicum* and occasionally *C. insidiosum*. Since the abundance peaks of *Corophium acherusicum* (fig. 8) and *Corophium* spp. [2] (fig. 9) in the South Bay were similar, these were assumed to be the same species, and distinct from *Corophium* spp. [1] in the North Bay.

Data from Palo Alto (Thompson and Nichols, 1984) suggest that *Eteone californica* (fig. 12) probably reproduces in spring in San Francisco Bay. This species may be the same as *E. longa* in New England (Carlton, 1979), which reproduces in April and May in the northwestern Atlantic and has a planktonic larva (Pettibone, 1963). The rapid decline of *Eteone* in San Pablo Bay during February 1983 and its low numbers at all sites suggest that conditions associated with high freshwater inflow might have prevented successful spring recruitment during that year.

Both *Nereis* (fig. 11), at the North Bay sites, and *Grandidierella* (fig. 10), at the South Bay sites, had low abundances in 1983 but were major components of the community in the summer to fall of 1984.

The third group of species, which showed highly seasonal abundance changes in both 1983 and 1984, included two of the most common South Bay species, *Gemma gemma* (fig. 13) and *Ampelisca abdita* (fig. 14). These species, apparently sensitive to low salinities, rarely occurred at the North Bay sites, and might have been affected at the South Bay sites as well. *Gemma*, usually one of the numerically dominant species at Palo Alto (Nichols and Thompson, 1985a), had low densities in early 1983 (see also Thompson and Nichols, 1984), rebounding to typically high numbers by late summer following seasonal recruitment of juveniles. *Gemma* numbers at Hayward remained relatively low throughout the study period, with a gradual increase from 1983 through 1984. *Ampelisca abdita*, which generally appears in abundance in early summer following spring reproduction (Nichols and Thompson, 1985a), did not reach high densities until August of 1983 at Palo Alto and was absent from Hayward until July 1984. The absence of *Ampelisca* at the Hayward site during summer 1983 is unexplained. Migration of *Ampelisca* might have been involved in its disappearance from both South Bay sites during the first half of 1983 and at Palo Alto during the period December to June of 1984. Data presented by Nichols and Thompson (1985b) suggest that *Ampelisca* moves out to deeper water when surface salinities are lowered after winter storms.

Present throughout the study were a number of species that did not show any consistent seasonal patterns. These included *Macoma balthica*, *Mya arenaria*, *Boonea* sp., *Heteromastus filiformis*, Oligochaeta spp., *Streblospio benedicti*, and *Capitella "capitata"* (figs. 15-21). *Macoma* (fig. 15) abundance increased somewhat at Hayward during late winter and spring 1984 and at Palo Alto during both summers, but showed only very slight increases at the other two sampling sites, without clear seasonal trends. These results are consistent with those of Nichols and Thompson (1985a), who also found *Macoma* to be very tolerant of the low salinities at Palo Alto during the winter of 1982-83. *Mya* (fig. 16), *Boonea* (fig. 17), and *Heteromastus* (fig. 18) also fluctuated without apparent pattern, the former two at very low densities. All three were most abundant at Palo Alto.

Oligochaeta (fig. 19) were not identified to species, so it is difficult to assess the effects of seasonal changes at any of the sites. Numbers varied widely at all sites, possibly reflecting effects of salinity changes on several different species.

Streblospio (fig. 20), another of the numerical dominants at the Palo Alto site (Nichols and Thompson, 1985a), decreased in abundance from 1983 through 1984 at Palo Alto, in contrast to species such as *Grandidierella*, *Eteone*, *Ampelisca*, and *Gemma*, while increasing slightly at the other three sites. Although there was some indication of seasonal abundance peaks in January 1984 and January 1985, there was too much variability to suggest any real trends. Erratic seasonal abundance fluctuations of this species were also typical during the 10-year study at Palo Alto by Nichols and Thompson (1985a).

Capitella "capitata" (fig. 21), which is well known as an opportunist species that responds quickly to a variety of habitat disturbances (Grassle and Grassle, 1974), began to appear at Palo Alto in late

1983, but its numbers were much too low to be considered a significant response.

Summary

Temporal variations in salinity levels and sediment types are known to be major factors influencing the distribution of benthic infauna on the San Francisco Bay mudflats (Nichols and Thompson, 1985b). It appears that extreme variations in river inflow, particularly in the North Bay, which result in extended periods of increased or decreased salinity, can have major effects on the community composition. Data collected during the drought period of 1976 and 1977 have shown that extended periods of low inflow, with consequent higher salinities, resulted in increased species abundances and species diversity at the upper end of the estuary (see Nichols and Thompson, 1985b, for references and discussion).

The present study suggests that extended periods of high river inflow may affect both species abundances and diversity in the North Bay and to a lesser extent in the South Bay. Several North Bay species showed an abundance peak during the high inflow year of 1983. A number of other species appeared to be depressed in numbers during 1983, reappearing in 1984, apparently responding to decreases in salinity followed by a return to more typical estuarine conditions. Several of the major mudflat species did not show any consistent year-to-year trends. Species responses to salinity conditions during the period of this study -- an extremely wet year followed by a more typical water year -- appeared to be a combination of varying tolerances to changing salinity conditions from year to year and variations in seasonal recruitment within years.

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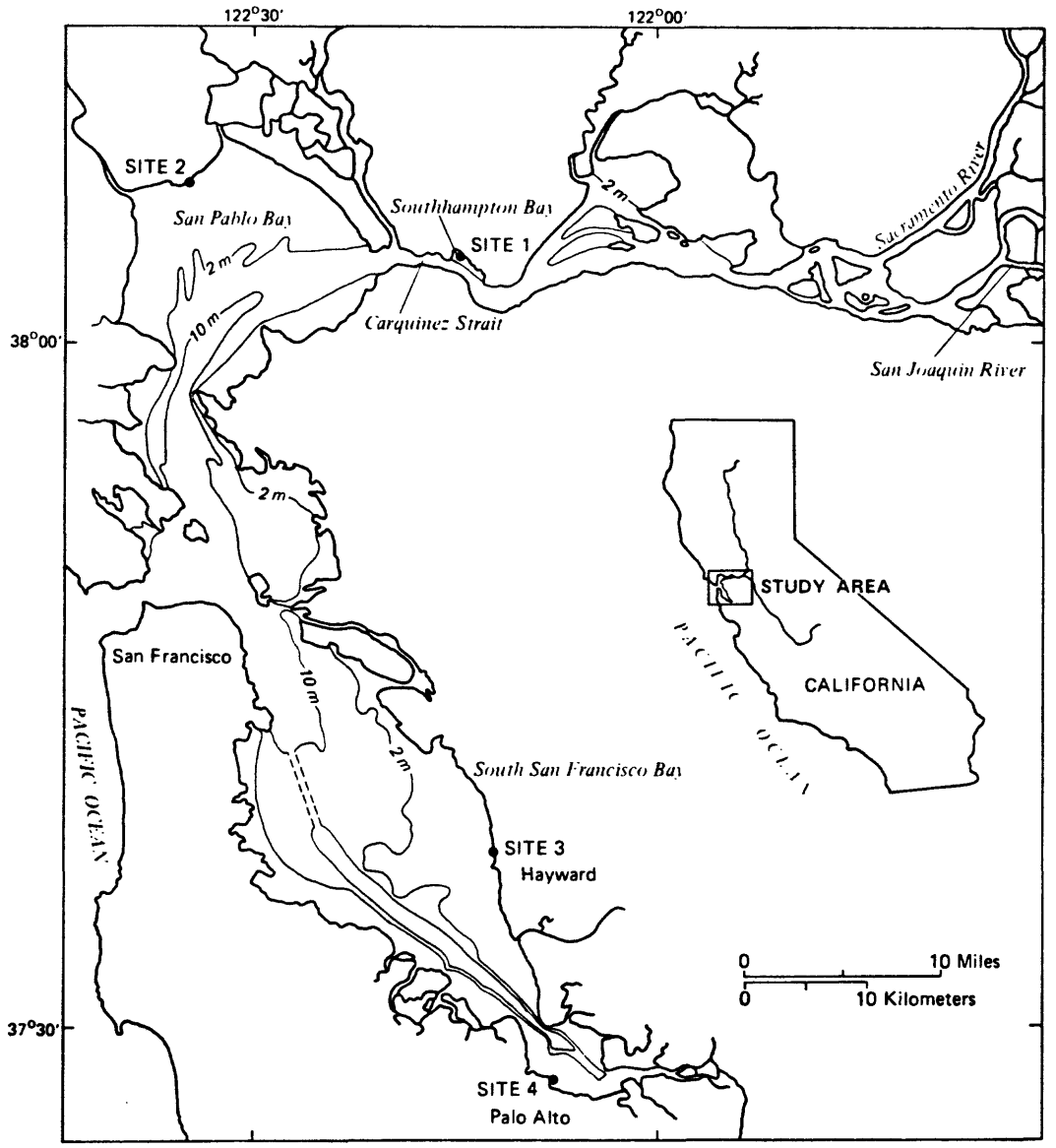


Figure 1. Map of San Francisco Bay, showing location of sampling sites.

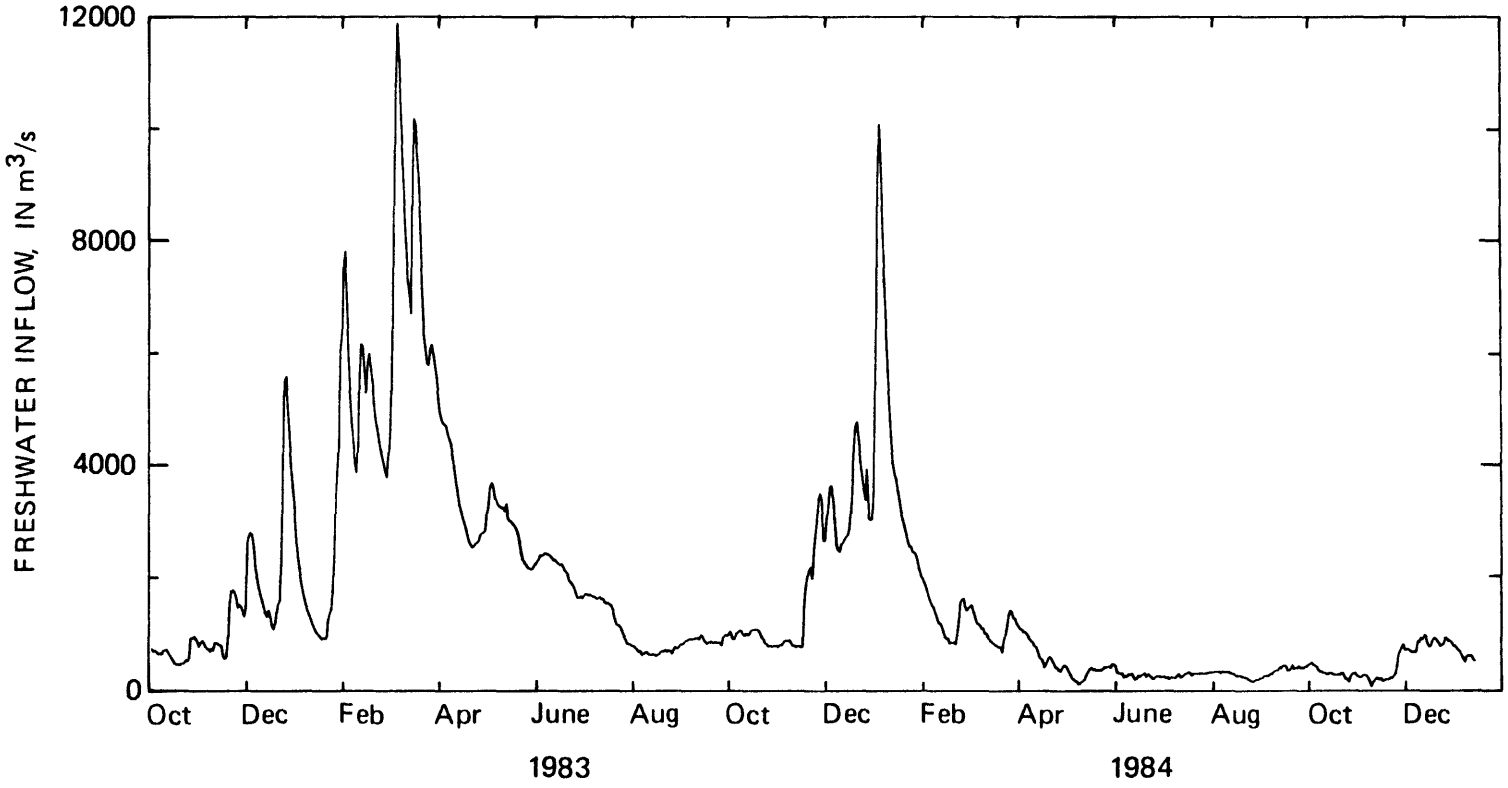


Figure 2. Freshwater inflow from Sacramento and San Joaquin Rivers to San Francisco Bay, October 1982 to January 1985.

(Calif. Dept. of Water Resources, 1986).

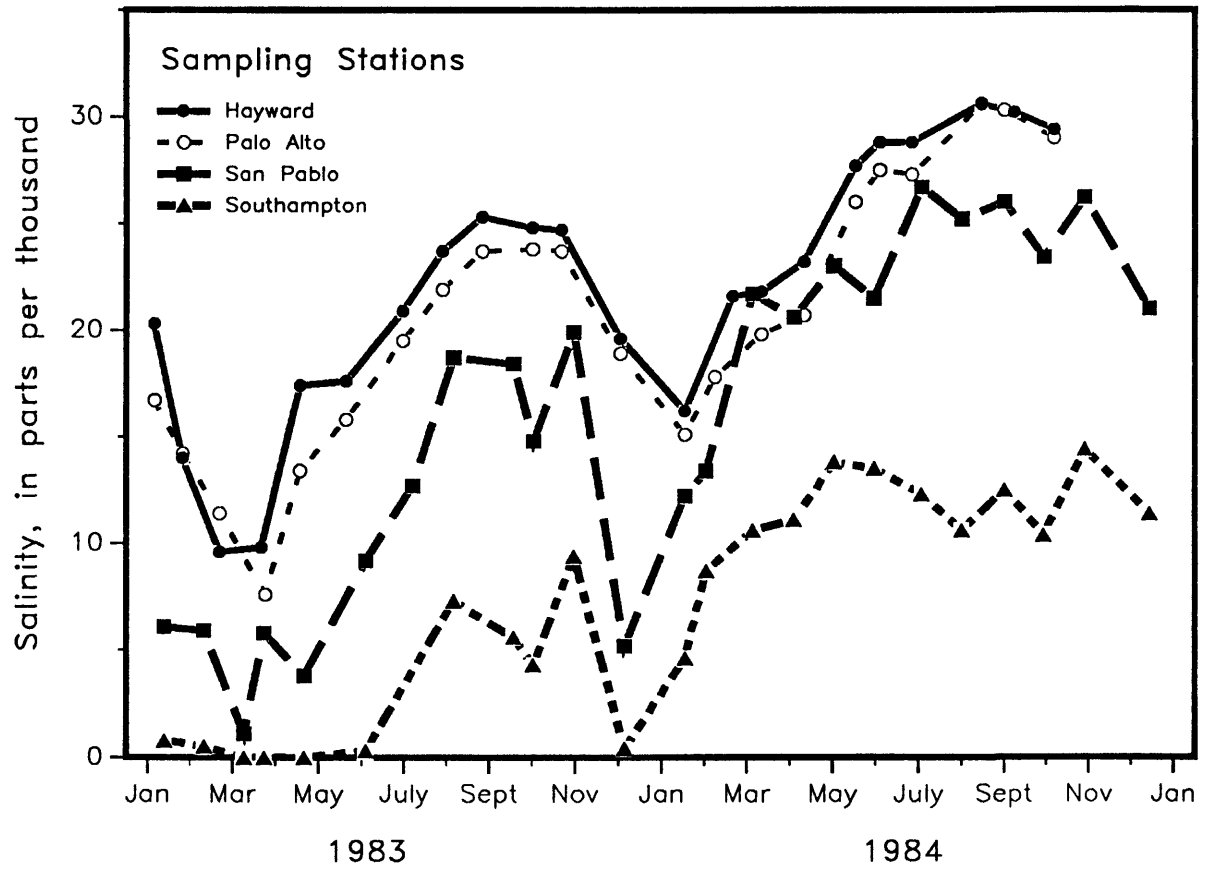
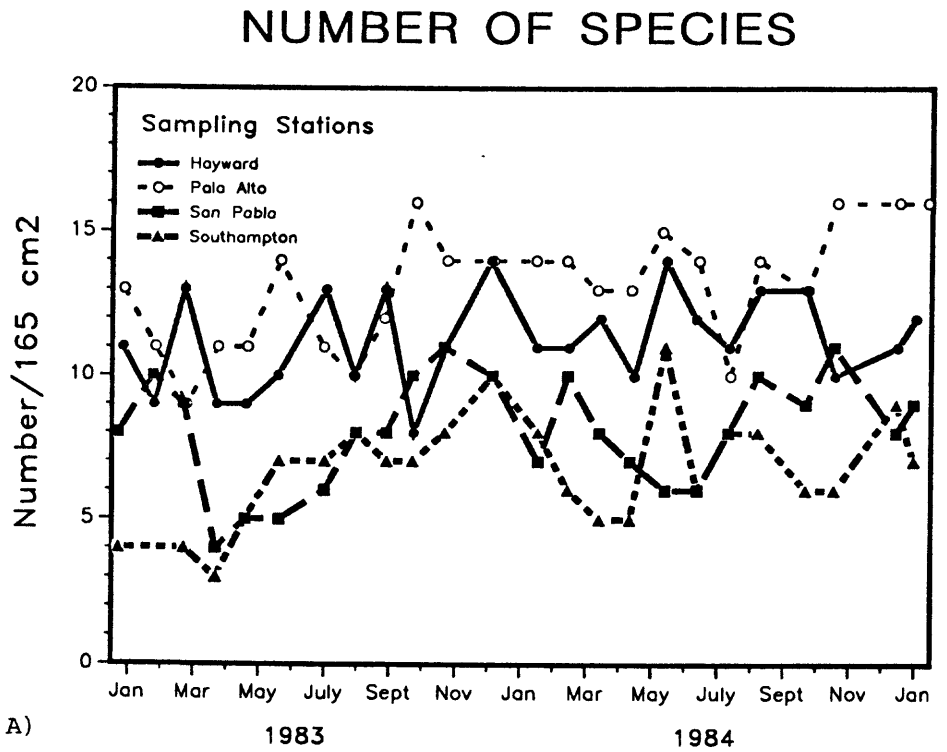


Figure 3. Salinity levels at the four sampling sites. (Calif. Dept. of Water Resources and J.E. Cloern, U.S.G.S.)



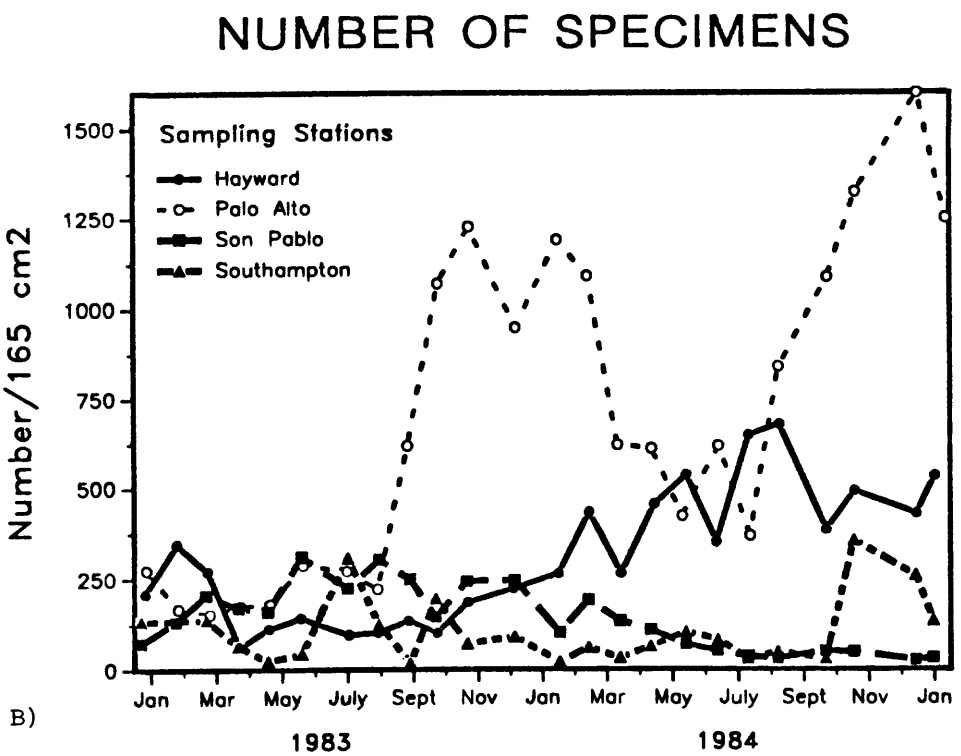


Figure 4. A) Total number of species at four sampling sites, San Francisco Bay, January 1983 through January 1985. B) Total number of specimens at the four sites.

Figures 5-21. *Abundances of major species at sampling stations 1 through 4. Corophium* spp. has been graphed separately for North Bay and South Bay sites (see text for explanation). Note that density scales vary.

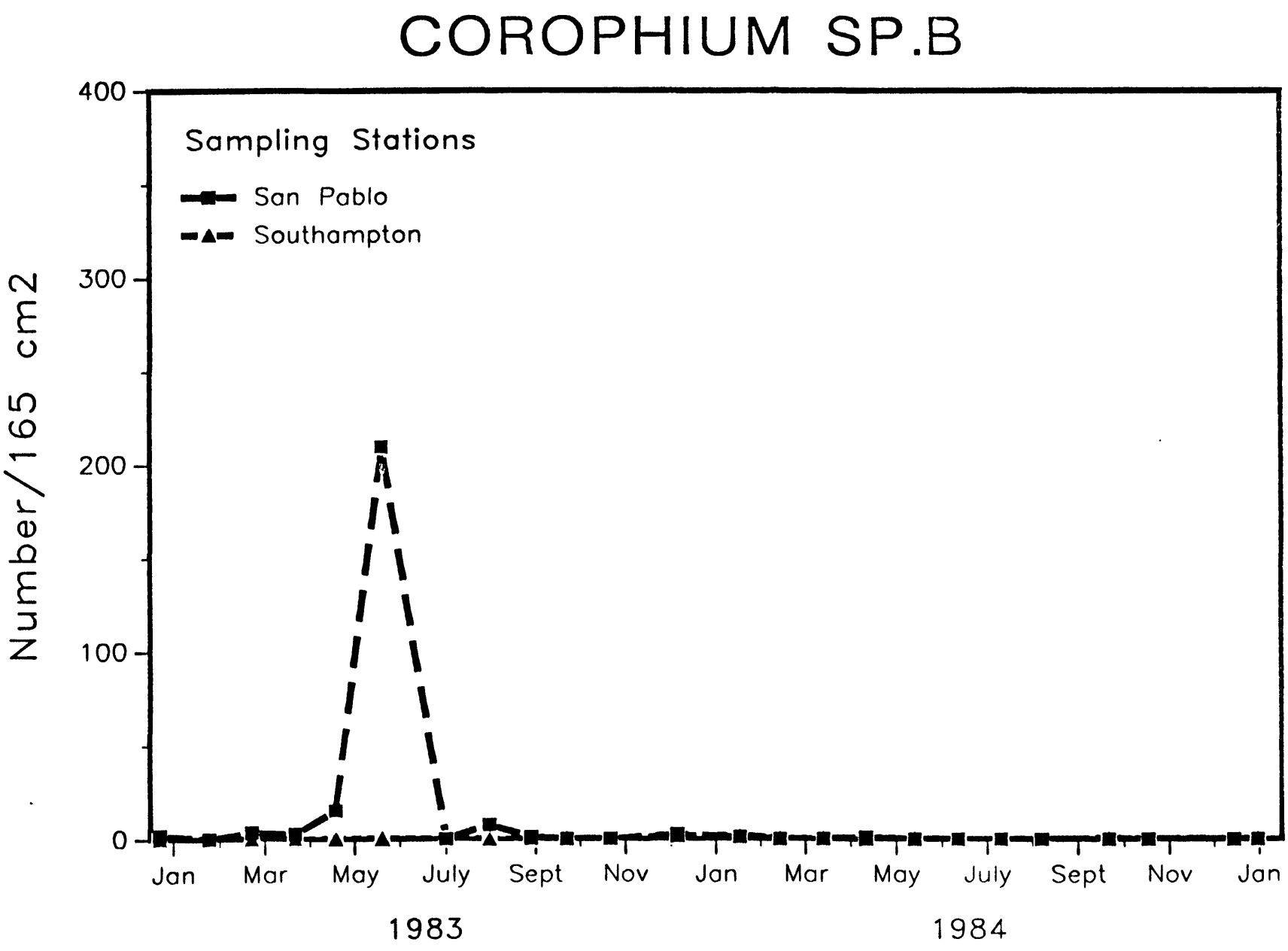

COROPHIUM SP.B
Sampling Stations
San Pablo
Southampton
Number/165 cm2
400
300
200
100
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 5

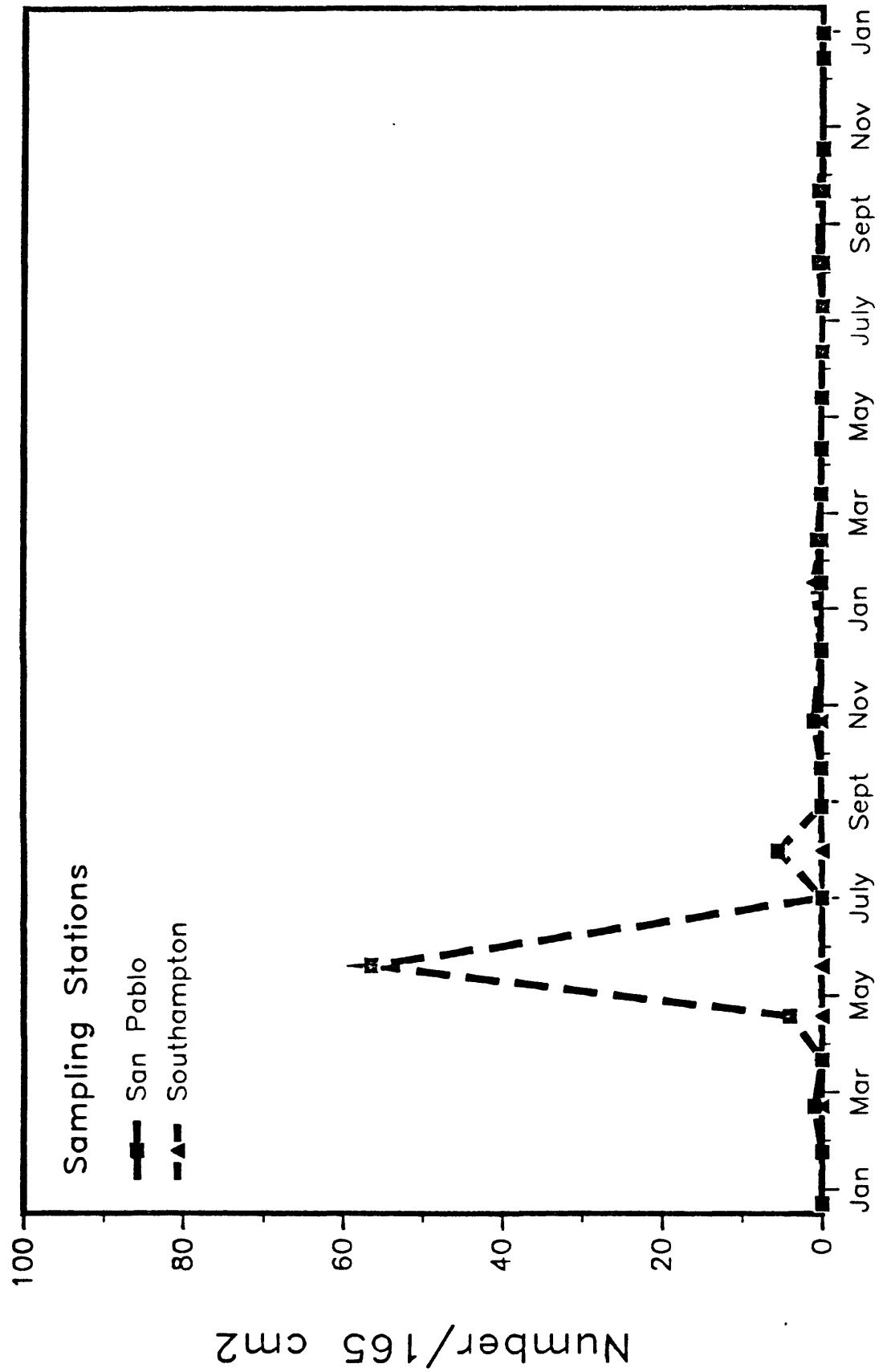

COROPHIUM SPP. [1]
Sampling Stations
San Pablo
Southampton
Number/165 cm2
100
80
60
40
20
0
Jan
Mar
May
July
Sept
Nov
Jan
1983
Jan
Mar
May
July
Sept
Nov
Jan
1984

Figure 6

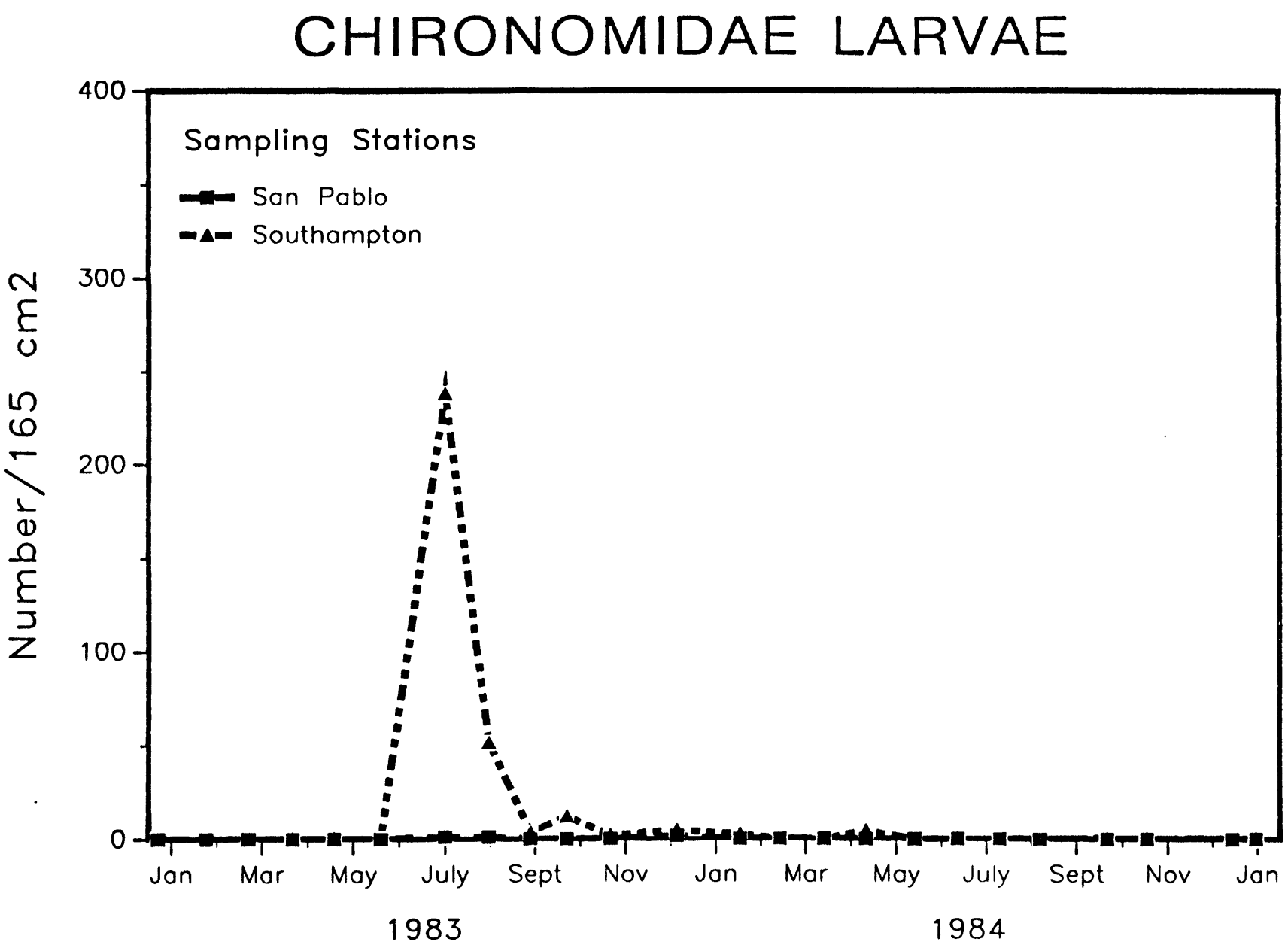

CHIRONOMIDAE LARVAE
Sampling Stations
San Pablo
Southampton
Number/165 cm2
400
300
200
100
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 7

COROPHIUM ACHERUSICUM

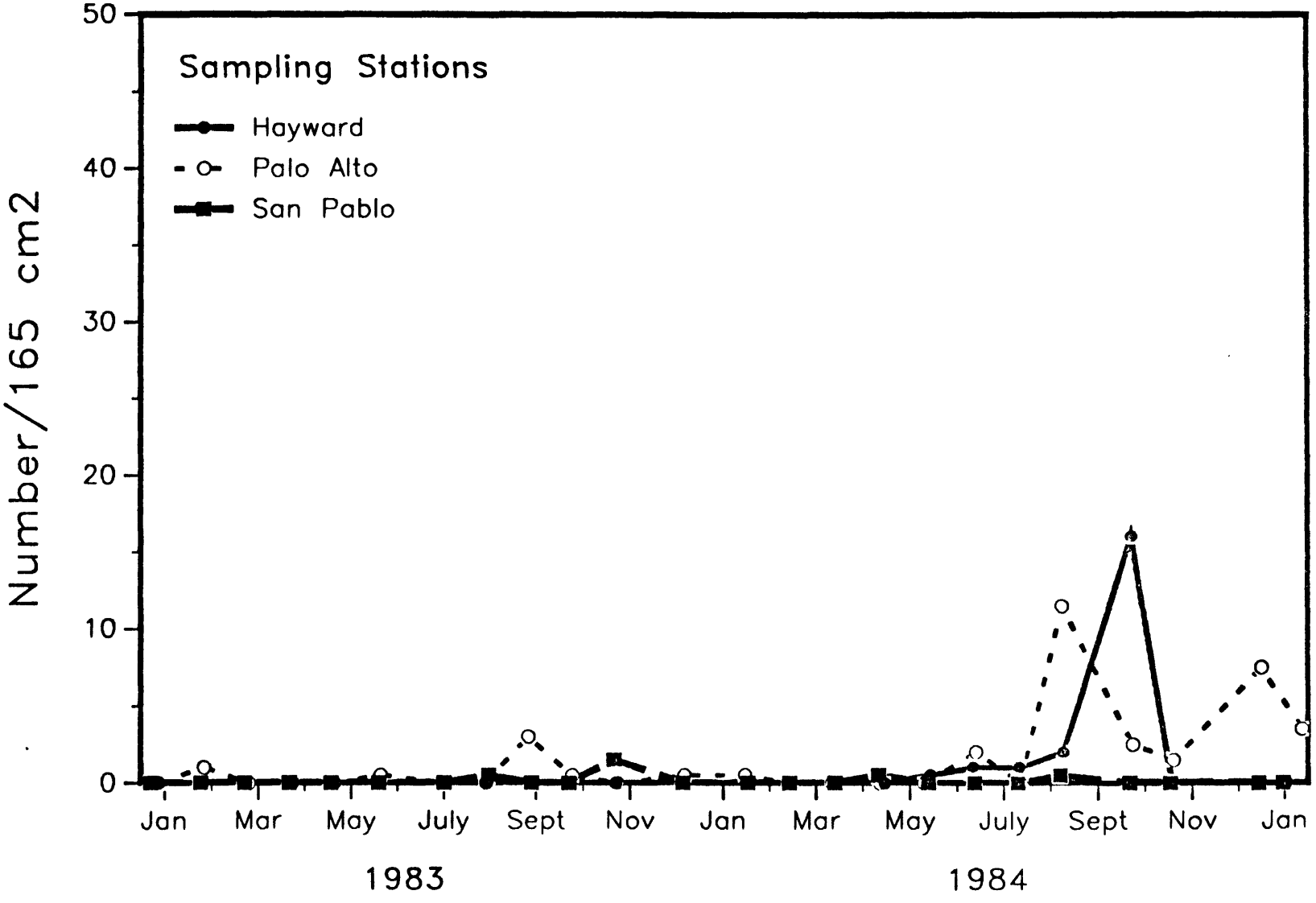


Figure 8

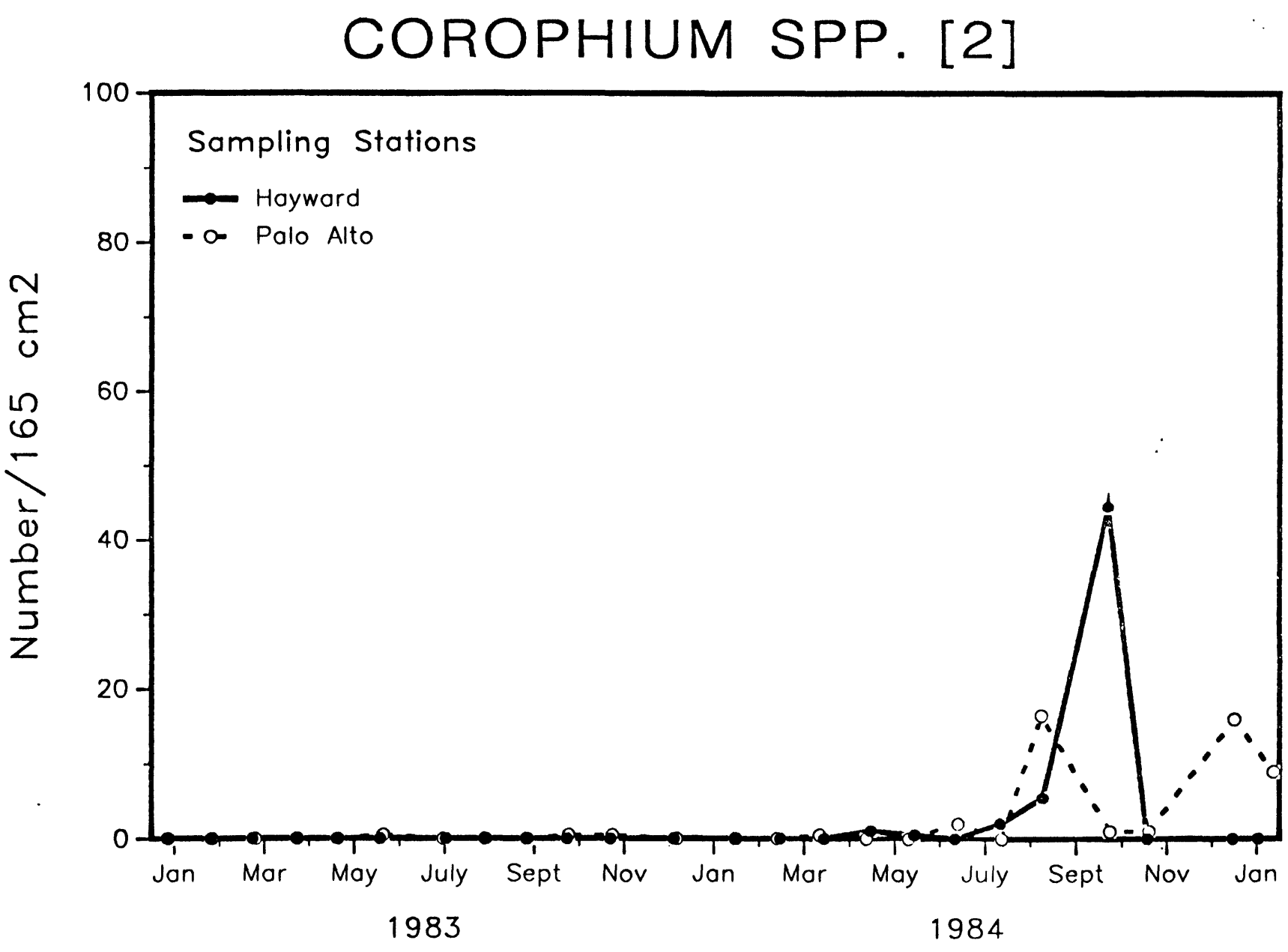

COROPHIUM SPP. [2]
Sampling Stations
Hayward
Palo Alto
Number/165 cm2
100
80
60
40
20
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 9

GRANDIDIERELLA JAPONICA

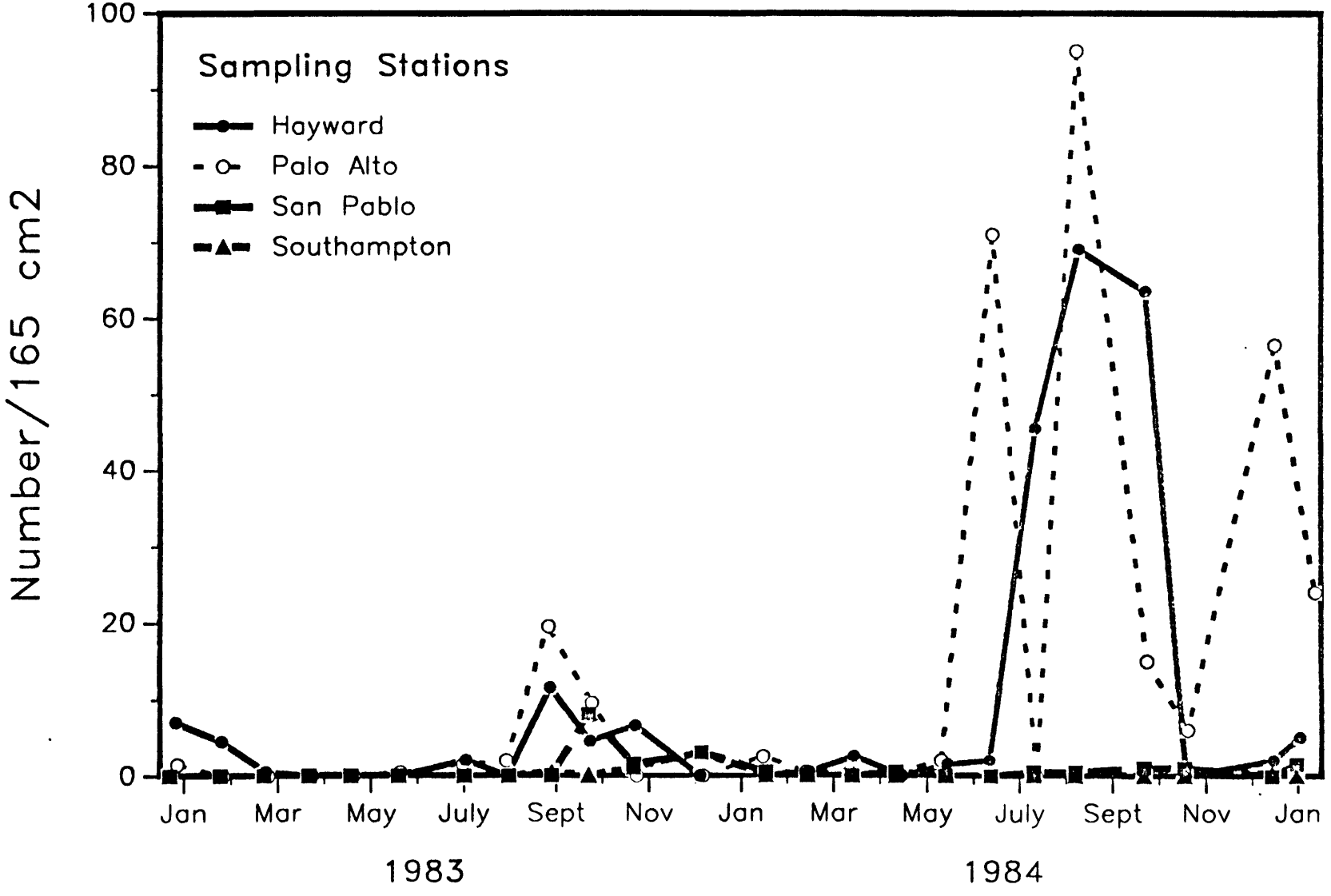


Figure 10

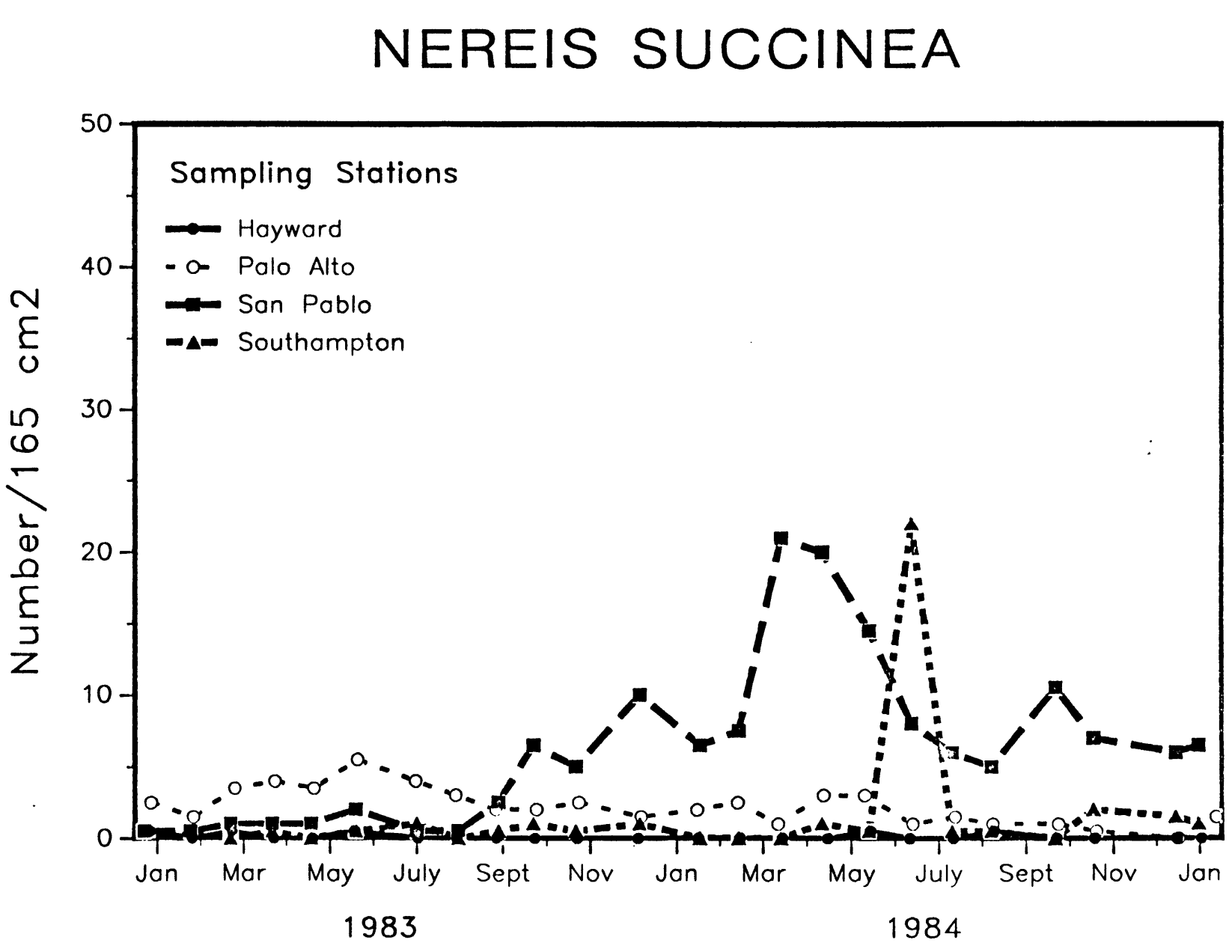

NEREIS SUCCINEA
Sampling Stations
Hayward
Palo Alto
San Pablo
Southampton
Number/165 cm2
50
40
30
20
10
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 11

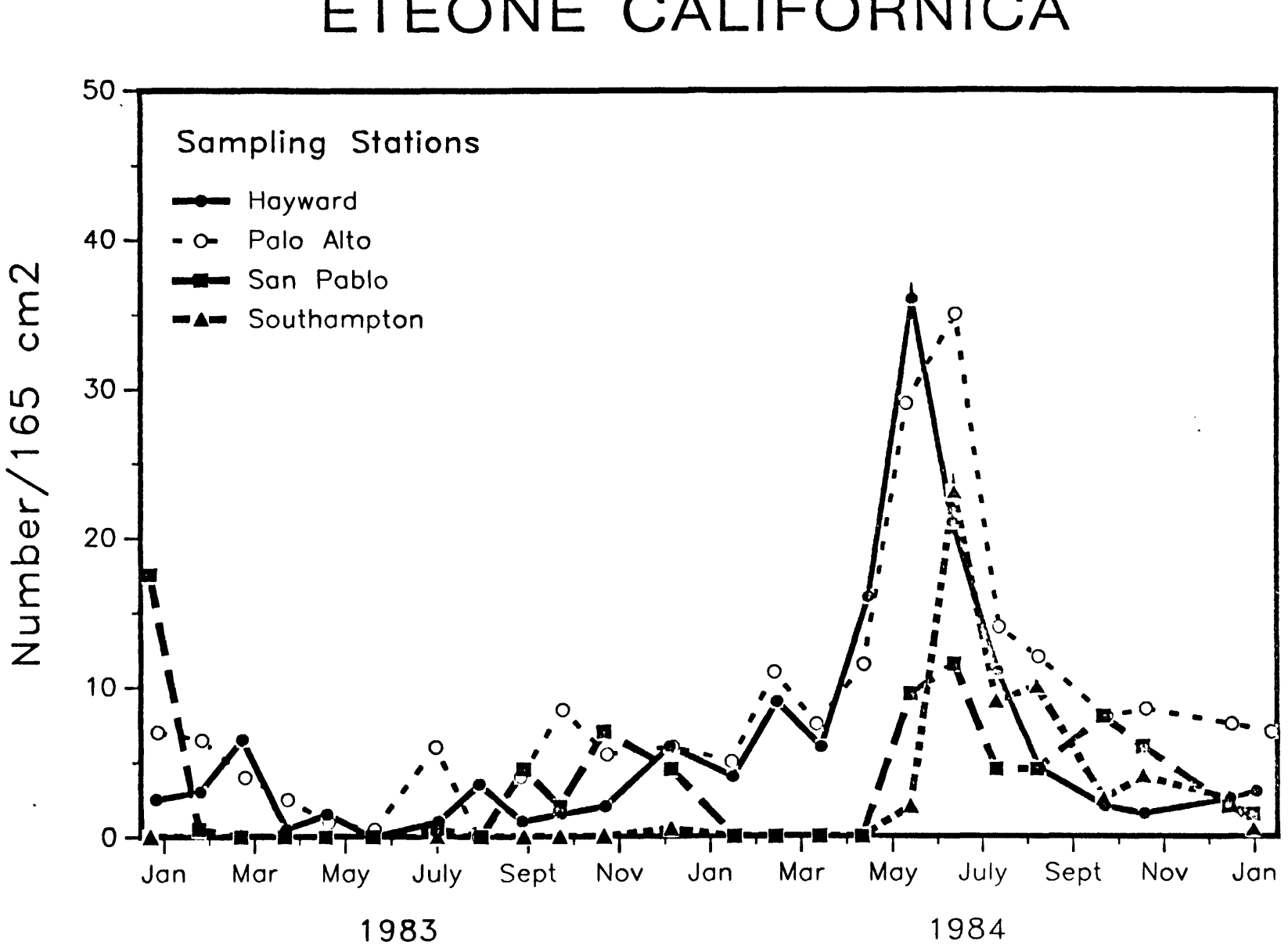

ETEONE CALIFORNICA
Sampling Stations
Hayward
Palo Alto
San Pablo
Southampton
Number/165 cm2
50
40
30
20
10
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 12

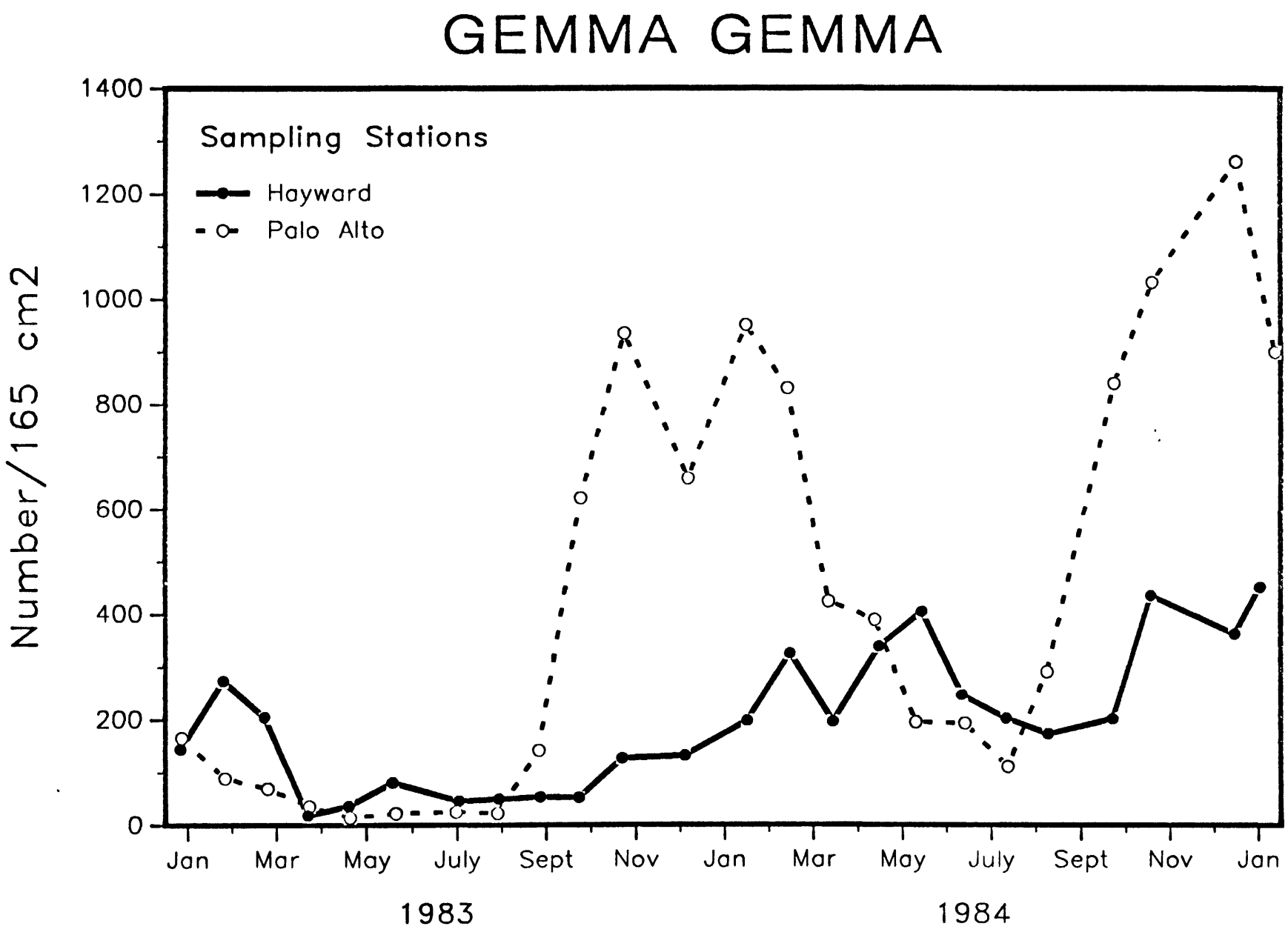

GEMMA GEMMA
Sampling Stations
Hayward
Palo Alto
Number/165 cm2
1400
1200
1000
800
600
400
200
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 13

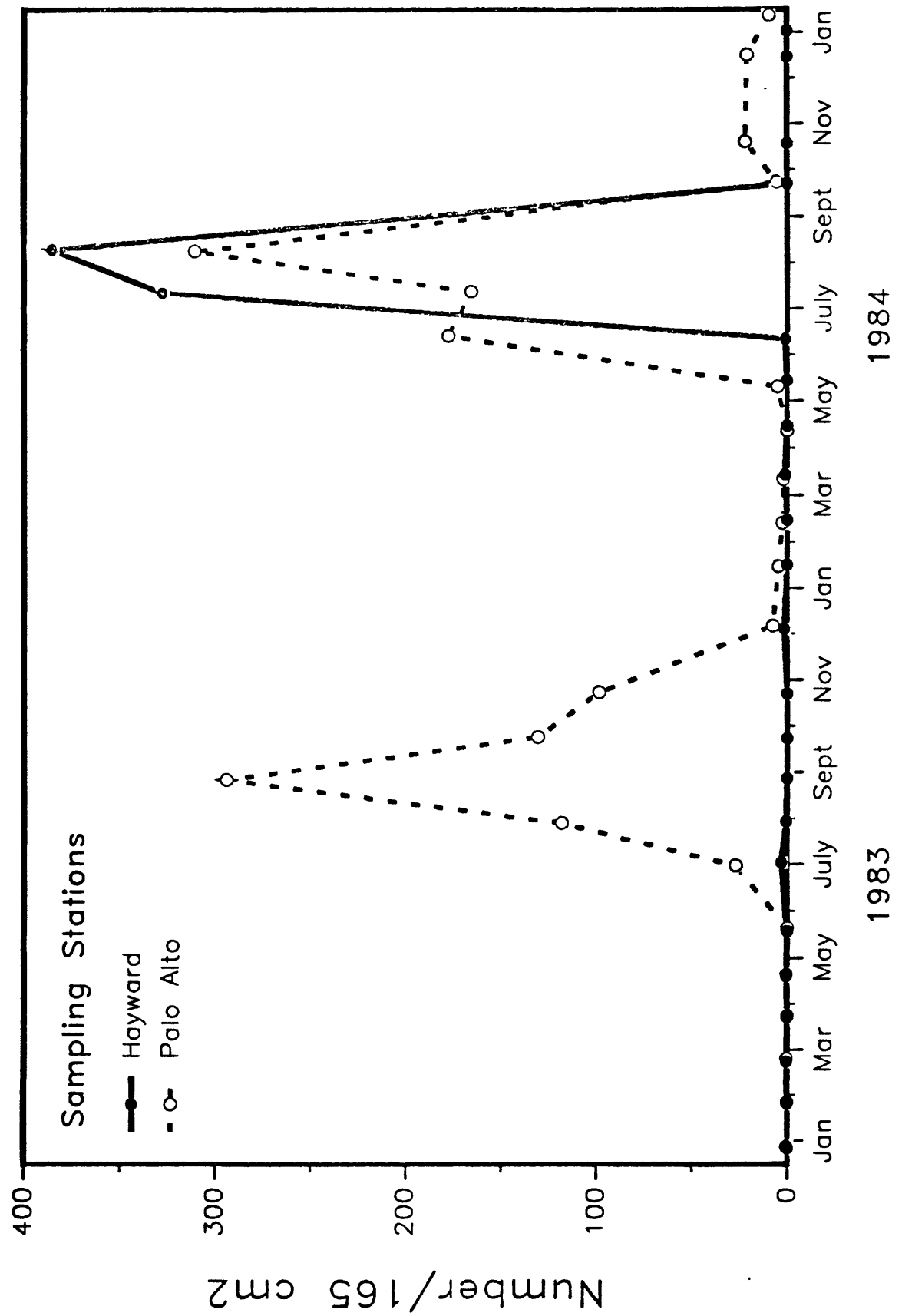

AMPELISCA ABDITA
Sampling Stations
Hayward
Palo Alto
Number/165 cm2
400
300
200
100
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 14

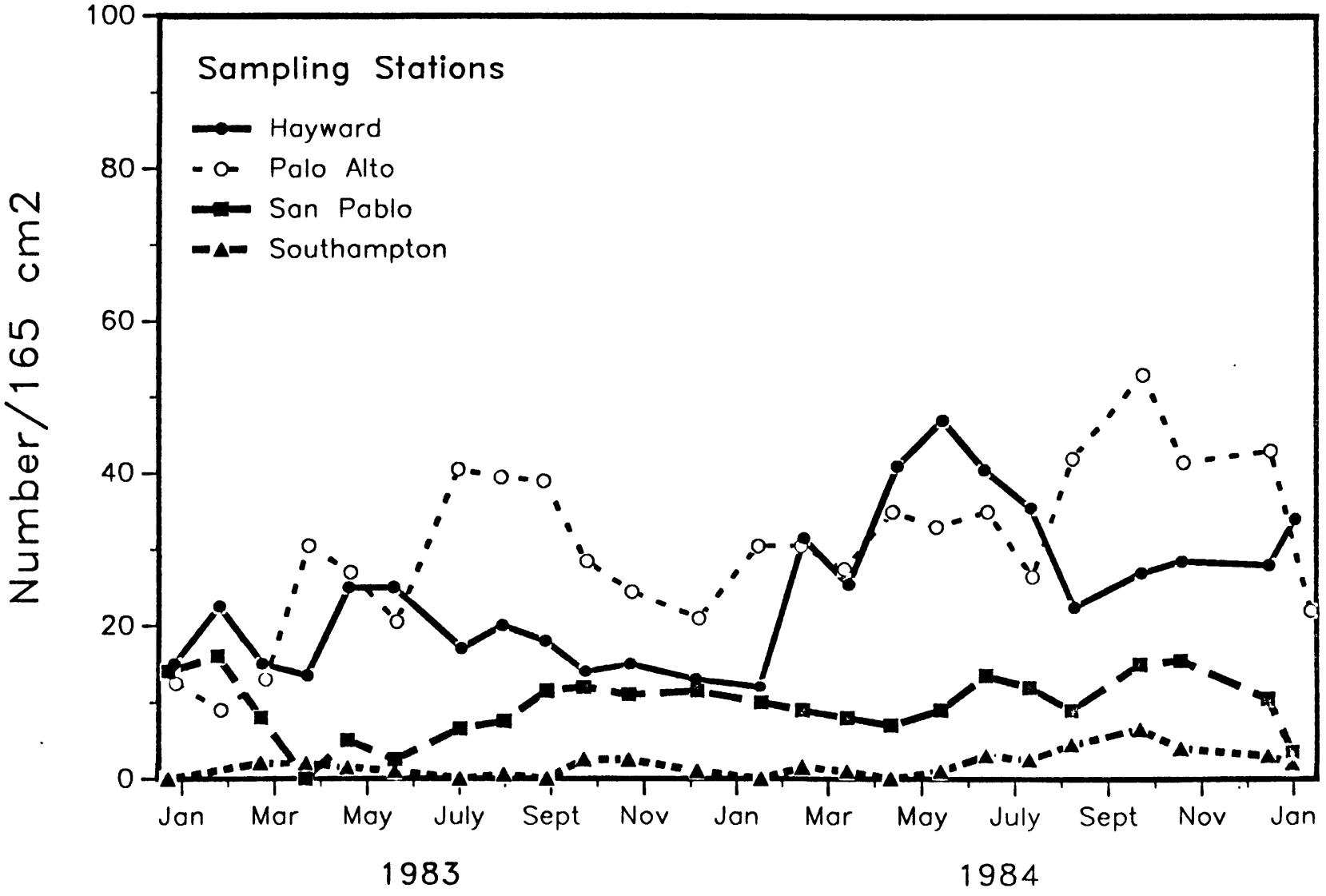

MACOMA BALTHICA
Sampling Stations
Hayward
Palo Alto
San Pablo
Southampton
Number/165 cm2
100
80
60
40
20
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 15

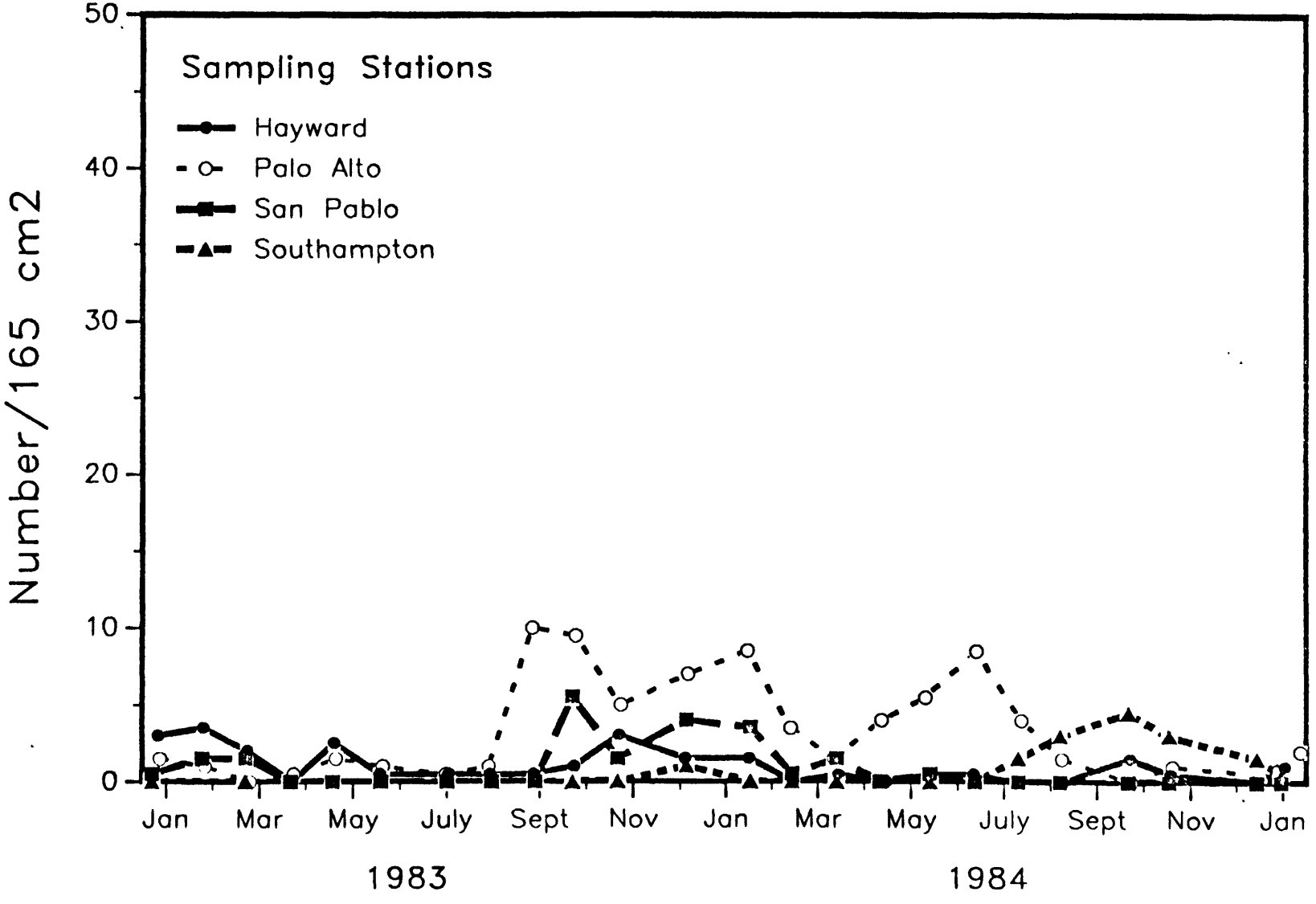

MYA ARENARIA
Sampling Stations
Hayward
Palo Alto
San Pablo
Southampton
Number/165 cm2
50
40
30
20
10
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 16

BOONEA SP.

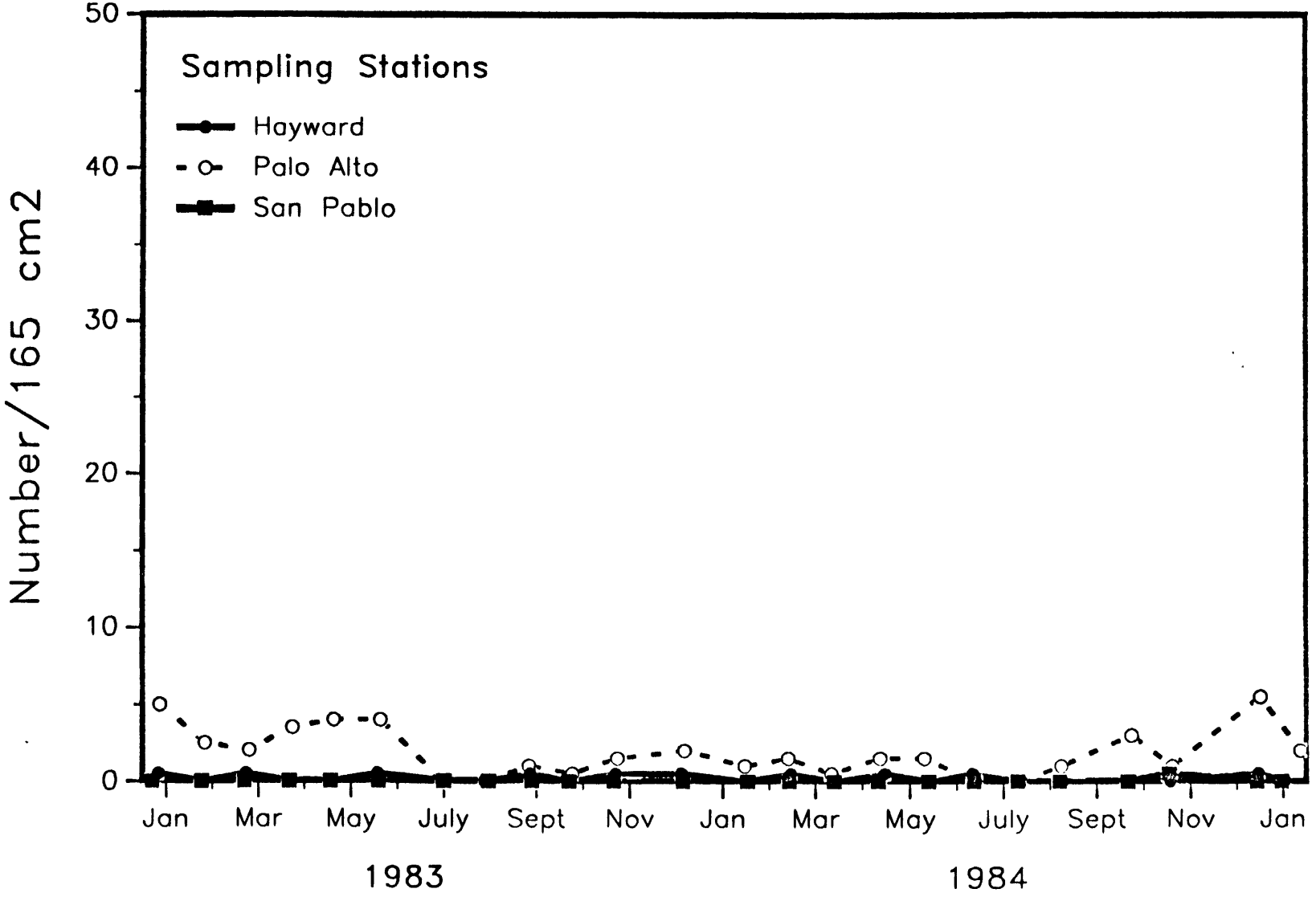


Figure 17

HETEROMASTUS FILIFORMIS

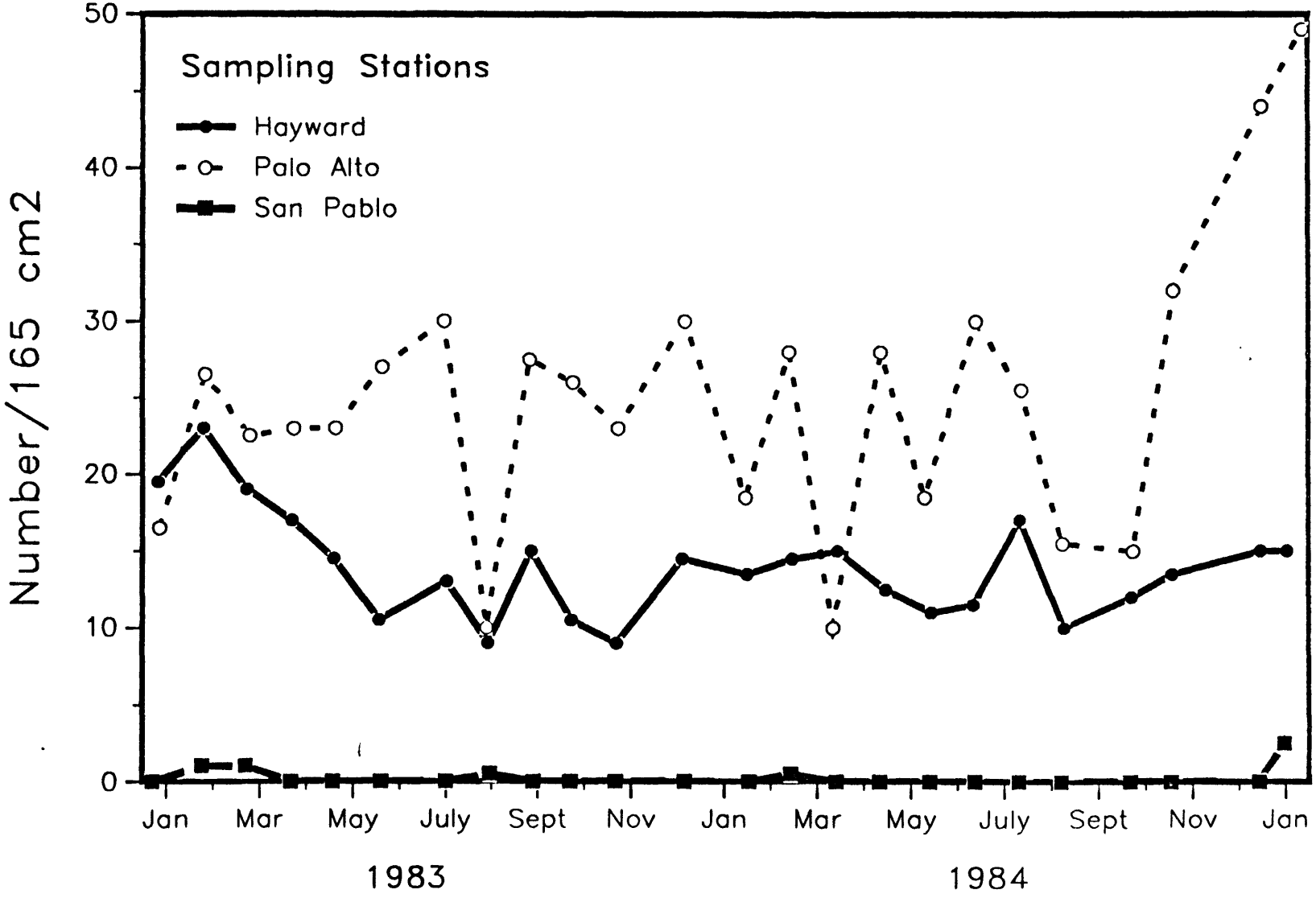


Figure 18

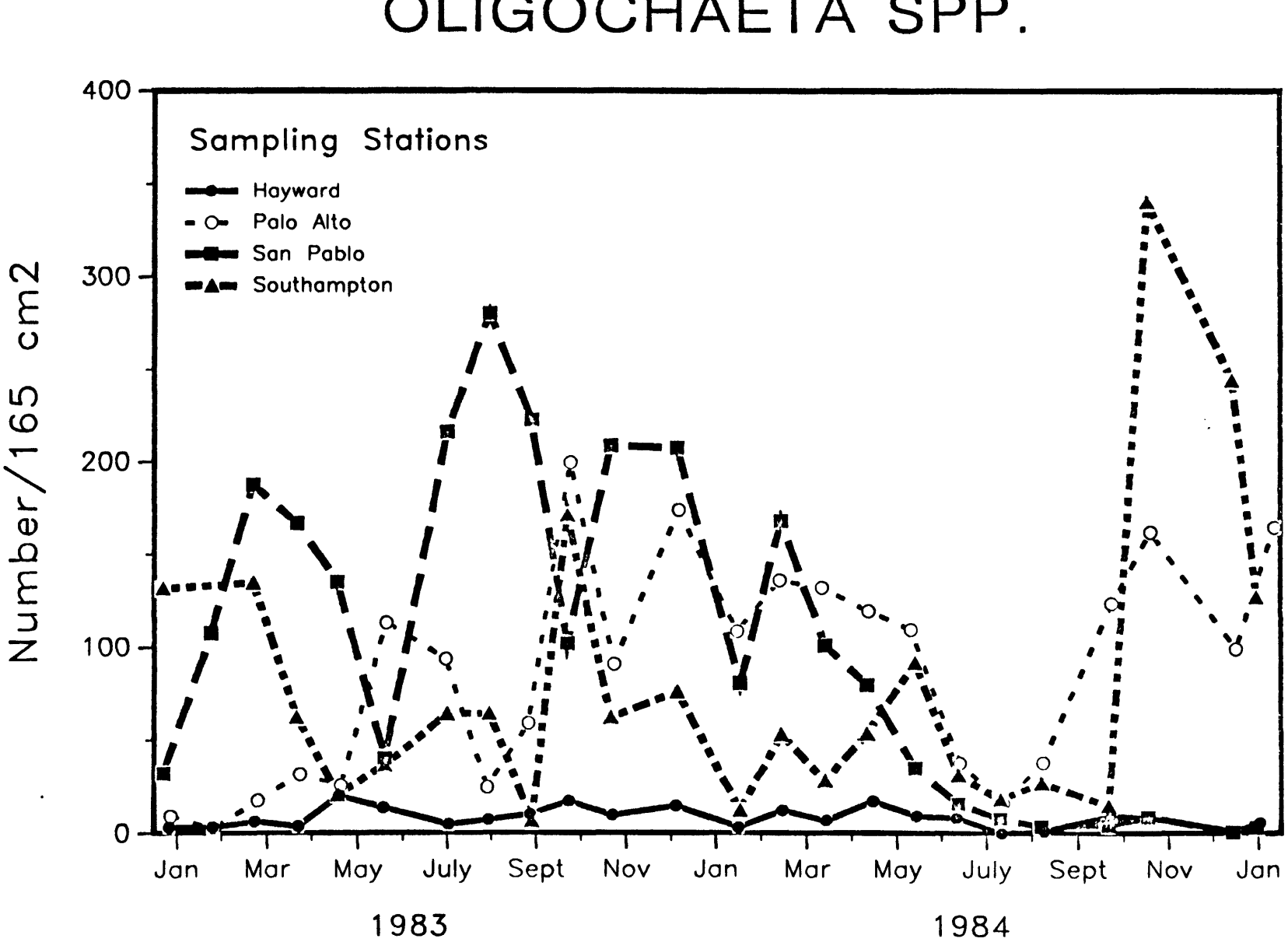

OLIGOCHAETA SPP.
Sampling Stations
Hayward
Palo Alto
San Pablo
Southampton
Number/165 cm2
400
300
200
100
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 19

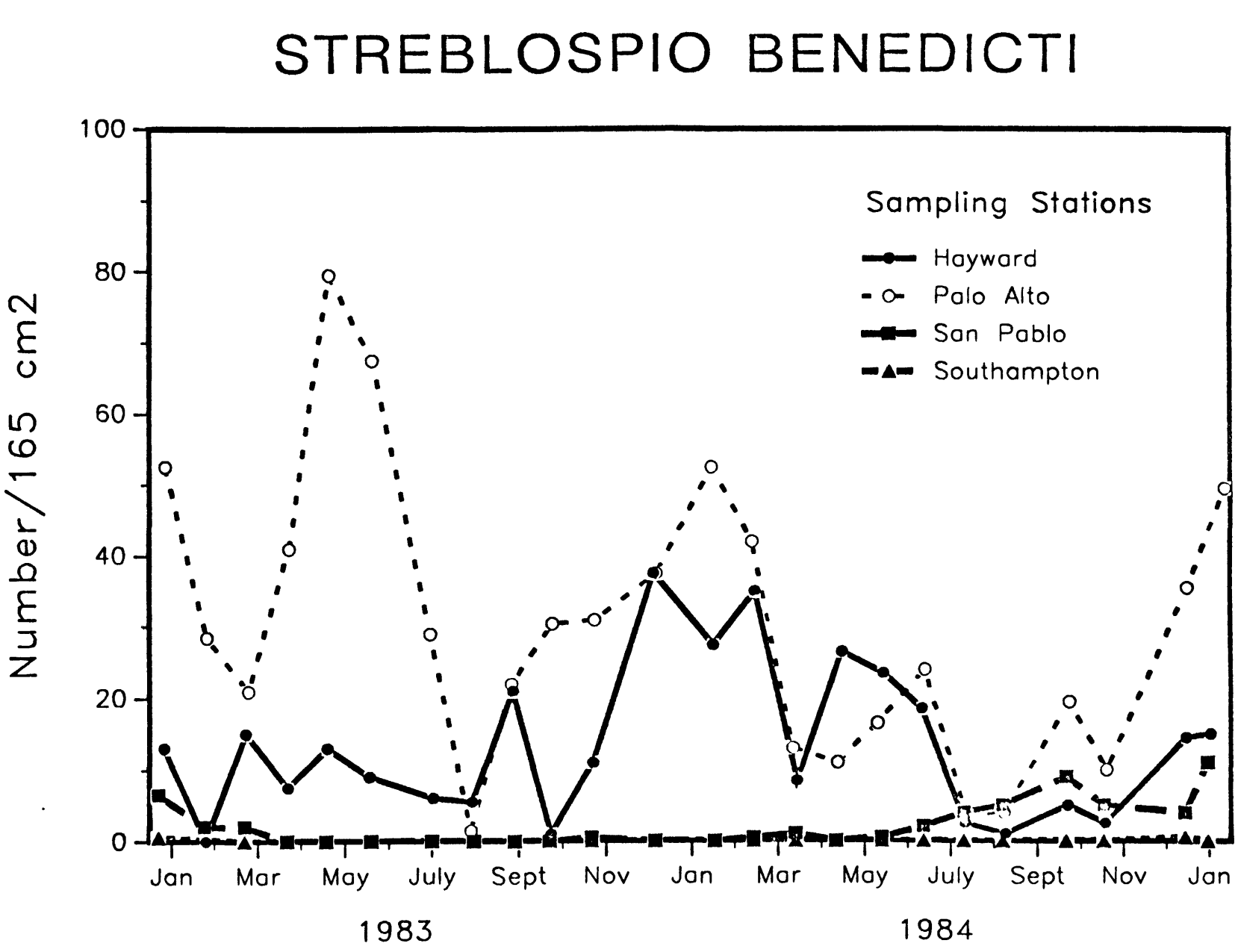

STREBLOSPIO BENEDICTI
Number/165 cm2
100
80
60
40
20
0
Sampling Stations
Hayward
Palo Alto
San Pablo
Southampton
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 20

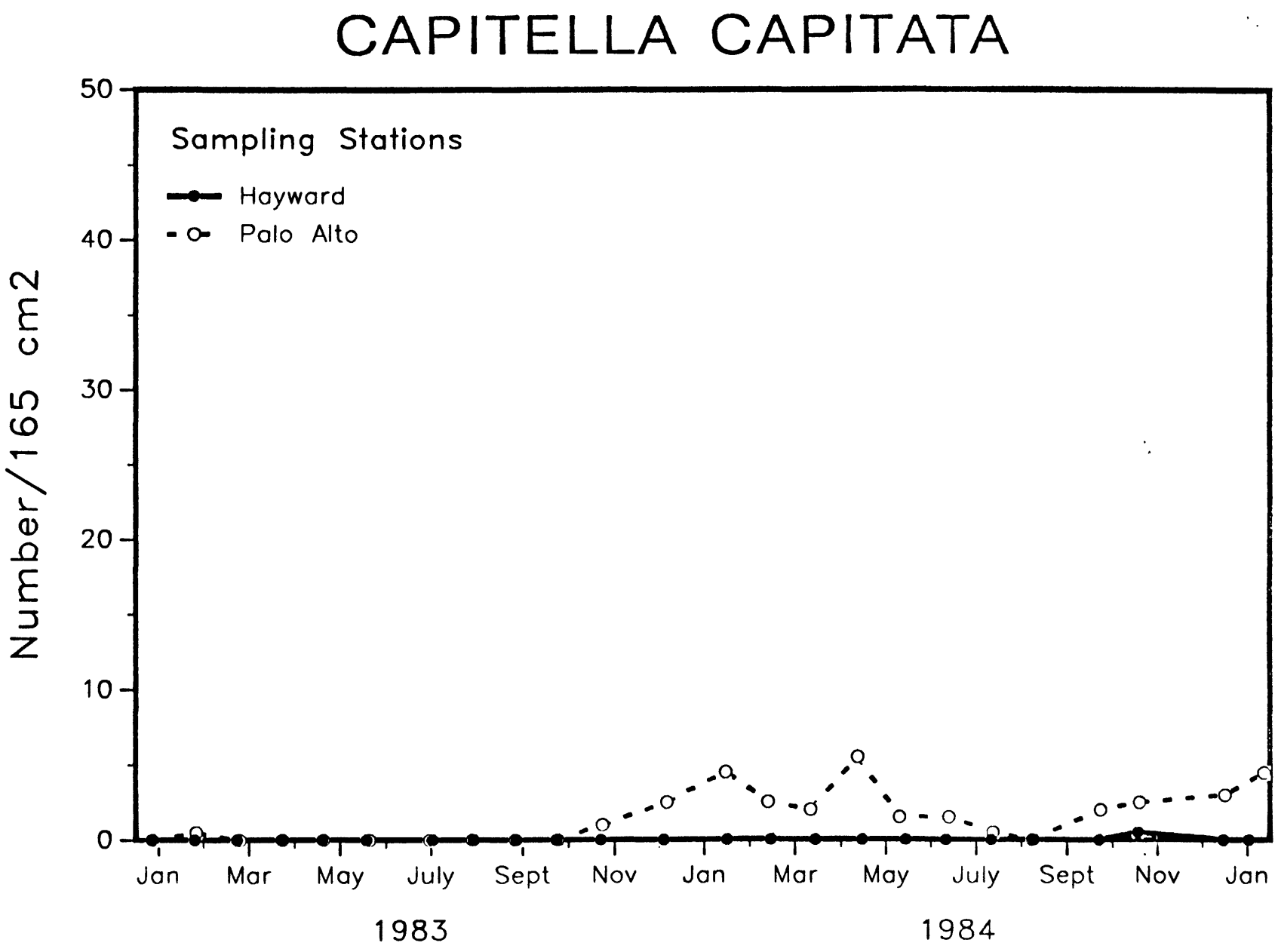

CAPITELLA CAPITATA
Sampling Stations
Hayward
Palo Alto
Number/165 cm2
50
40
30
20
10
0
Jan
Mar
May
July
Sept
Nov
Jan
Mar
May
July
Sept
Nov
Jan
1983
1984

Figure 21

Table 1. *List of macrobenthic species found at four sampling stations, Southampton, San Pablo, Hayward, and Palo Alto, from January 1983 through January 1985*

Species	Comments
ANNELIDA	
Eteone californica	Probably = *E. longa*
Nereis succinea	
Polydora ligni	
Pseudopolydora kempi	
Spiophanes berkeleyorum	
Streblospio benedicti	
Capitella "capitata"	May be a number of sibling species
Heteromastus filiformis	
Oligochaeta spp.	
CRUSTACEA	
Cyprideis sp.	
Cirripedia sp.	
Cumella vulgaris	
Tanaidae	
Gnorimosphaeroma oregonensis	
Sphaeroma quoyana	
Synidotea laticauda	
Ampelisca abdita	= *A. milleri*
Corophium acherusicum	
Corophium insidiosum	
Corophium spinicorne	
Corophium stimpsoni	
Corophium sp.B	Introduced species, see text
Corophium spp.	Unidentifiable (females or parts missing)
Grandidierella japonica	
Melita sp.	
Caridea	
Hemigrapsis oregonensis	
INSECTA	
Chironomidae larvae	tent. id. *Paraclunio alaskensis*
Insecta juvenile	Dipteran pupae
MOLLUSCA	
Boonea sp.	= *Odostomia*
Ilyanassa obsoleta	Formerly *Nassarius obsoletus*
Nudibranchia	
Musculista senhousia	Formerly *Musculus senhousia*
Corbicula manilensis	
Gemma gemma	
Tapes japonica	
Macoma balthica	
Mya arenaria	

Table 2. *Species count data collected at Southampton sampling station (Site 1) with a 16.5 x 10 centimeter can core from January 1983 through January 1985*

SOUTHAMPTON

Date: 6/Jan/83 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	64.0	199.0	131.5	95.5
Streblospio benedicti	0.	1.0	0.5	0.7
ARTHROPODA				
Ostracoda sp.	0.	2.0	1.0	1.4

SOUTHAMPTON

Date: 7/Mar/83 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Oligochaeta spp.	161.0	108.0	134.5	37.5
Polydora ligni	0.	1.0	0.5	0.7
ARTHROPODA				
Isopoda sp.	0.	1.0	0.5	0.7
MOLLUSCA				
Macoma balthica	0.	4.0	2.0	2.8

SOUTHAMPTON

Date: 5/Apr/83 Sample size = 0.017m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	74.0	50.0	62.0	17.0
MOLLUSCA				
Macoma balthica	0.	4.0	2.0	2.8

SOUTHAMPTON

Date: 2/May/83 Sample size = 0.017m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Oligochaeta spp.	19.0	22.0	20.5	2.1
ARTHROPODA				
Ampelisca abdita	0.	1.0	0.5	0.7
Amphipoda sp.	1.0	0.	0.5	0.7
MOLLUSCA				
Gemma gemma	1.0	0.	0.5	0.7
Macoma balthica	3.0	0.	1.5	2.1

SOUTHAMPTON

Date: 2/Jun/83 Sample size = 0.017m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	1.0	0.	0.5	0.7
Oligochaeta spp.	45.0	28.0	36.5	12.0
Spiophanes berkeleyorum	1.0	0.	0.5	0.7
ARTHROPODA				
Gnorimosphaeroma oregonensis	0.	2.0	1.0	1.4
Insecta pupae	1.0	2.0	1.5	0.7
Synidotea laticauda	1.0	2.0	1.5	0.7
MOLLUSCA				
Macoma balthica	0.	2.0	1.0	1.4

SOUTHAMPTON

Date: 14/Jul/83 Sample size = 0.017m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	1.0	1.0	1.0	0.
Oligochaeta spp.	33.0	95.0	64.0	43.8
Polydora ligni	0.	1.0	0.5	0.7
ARTHROPODA				
Chironomidae larvae	238.0	238.0	238.0	0.
Corophium stimpsoni	1.0	0.	0.5	0.7
Insecta pupae	3.0	2.0	2.5	0.7
MOLLUSCA				
Gemma gemma	0.	1.0	0.5	0.7

SOUTHAMPTON

Date: 12/Aug/83 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Oligochaeta spp.	42.0	86.0	64.0	31.1
ARTHROPODA				
Chironomidae larvae	49.0	54.0	51.5	3.5
Copepoda sp.	10.0	1.0	5.5	6.4
Corophium spinicorne	1.0	0.	0.5	0.7
Insecta pupae	1.0	0.	0.5	0.7
MOLLUSCA				
Corbicula manilensis	0.	1.0	0.5	0.7
Macoma balthica	1.0	0.	0.5	0.7
NEMERTEA				
Nemertea spp.	0.	1.0	0.5	0.7

SOUTHAMPTON

Date: 9/Sep/83 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	9.0	4.0	6.5	3.5
ARTHROPODA				
Chironomidae larvae	5.0	2.0	3.5	2.1
Cirripedia sp.	0.	5.0	2.5	3.5
Corophium spinicorne	0.	4.0	2.0	2.8
Grandidierella japonica	1.0	0.	0.5	0.7
Synidotea laticauda	2.0	1.0	1.5	0.7

SOUTHAMPTON

Date: 3/Oct/83 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	1.0	1.0	1.0	0.
Oligochaeta spp.	284.0	58.0	171.0	159.8
Polydora ligni	5.0	9.0	7.0	2.8
ARTHROPODA				
Chironomidae larvae	13.0	11.0	12.0	1.4
Cirripedia sp.	0.	1.0	0.5	0.7
Gnorimosphaeroma oregonensis	1.0	0.	0.5	0.7
MOLLUSCA				
Macoma balthica	1.0	4.0	2.5	2.1

SOUTHAMPTON

Date: 1/Nov/83 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	1.0	0.	0.5	0.7
Oligochaeta spp.	57.0	67.0	62.0	7.1
Polydora ligni	0.	2.0	1.0	1.4
ARTHROPODA				
Chironomidae larvae	2.0	2.0	2.0	0.
Grandidierella japonica	0.	2.0	1.0	1.4
Synidotea laticauda	2.0	0.	1.0	1.4
MOLLUSCA				
Macoma balthica	2.0	3.0	2.5	0.7
Nudibranchia sp.	0.	2.0	1.0	1.4

SOUTHAMPTON

Date: 15/Dec/83 Sample size = 0.017m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	0.	1.0	0.5	0.7
Nereis succinea	1.0	1.0	1.0	0.
Oligochaeta spp.	28.0	124.0	76.0	67.9
Polydora ligni	0.	1.0	0.5	0.7
ARTHROPODA				
Chironomidae larvae	3.0	6.0	4.5	2.1
Corophium sp.B	2.0	1.0	1.5	0.7
Grandidierella japonica	0.	6.0	3.0	4.2
Synidotea laticauda	0.	1.0	0.5	0.7
MOLLUSCA				
Macoma balthica	2.0	0.	1.0	1.4
Mya arenaria	0.	2.0	1.0	1.4

SOUTHAMPTON

Date: 26/Jan/84 Sample size = 0.017m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Oligochaeta spp.	5.0	19.0	12.0	9.9
Polydora ligni	1.0	0.	0.5	0.7
ARTHROPODA				
Chironomidae larvae	1.0	4.0	2.5	2.1
Cirripedia sp.	0.	1.0	0.5	0.7
Corophium sp.B	3.0	1.0	2.0	1.4
Corophium spp.	0.	2.0	1.0	1.4
Sphaeroma quoyana	0.	2.0	1.0	1.4
MOLLUSCA				
Gemma gemma	0.	4.0	2.0	2.8

SOUTHAMPTON

Date: 22/Feb/84 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Oligochaeta spp.	90.0	16.0	53.0	52.3
Polydora ligni	1.0	1.0	1.0	0.
ARTHROPODA				
Corophium spinicorne	2.0	1.0	1.5	0.7
Corophium sp.B	1.0	0.	0.5	0.7
MOLLUSCA				
Gemma gemma	1.0	3.0	2.0	1.4
Macoma balthica	1.0	2.0	1.5	0.7

SOUTHAMPTON

Date: 22/Mar/84 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Oligochaeta spp.	55.0	1.0	28.0	38.2
Polydora ligni	0.	1.0	0.5	0.7
ARTHROPODA				
Cirripedia sp.	0.	1.0	0.5	0.7
MOLLUSCA				
Gemma gemma	0.	2.0	1.0	1.4
Macoma balthica	2.0	0.	1.0	1.4

SOUTHAMPTON

Date: 19/Apr/84 Sample size = 0.017m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	1.0	1.0	1.0	0.
Oligochaeta spp.	72.0	35.0	53.5	26.2
Polydora ligni	1.0	0.	0.5	0.7
ARTHROPODA				
Chironomidae larvae	4.0	5.0	4.5	0.7
NEMERTEA				
Nemertea spp.	0.	8.0	4.0	5.7

SOUTHAMPTON

Date: 21/May/84 Sample size = 0.017m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	2.0	2.0	2.0	0.
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	65.0	118.0	91.5	37.5
ARTHROPODA				
Amphipoda sp.	0.	1.0	0.5	0.7
Ampelisca sp.A	0.	1.0	0.5	0.7
Cirripedia sp.	0.	1.0	0.5	0.7
Cumella vulgaris	1.0	1.0	1.0	0.
MOLLUSCA				
Gemma gemma	0.	1.0	0.5	0.7
Macoma balthica	2.0	0.	1.0	1.4
Pyramidellidae sp.	0.	1.0	0.5	0.7
NEMERTEA				
Nemertea spp.	0.	8.0	4.0	5.7

SOUTHAMPTON

Date: 19/Jun/84 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	9.0	37.0	23.0	19.8
Nereis succinea	18.0	26.0	22.0	5.7
Oligochaeta spp.	34.0	28.0	31.0	4.2
Polydora ligni	1.0	4.0	2.5	2.1
Pseudopolydora kempi	0.	1.0	0.5	0.7
MOLLUSCA				
Macoma balthica	3.0	3.0	3.0	0.

SOUTHAMPTON

Date: 17/Jul/84 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	10.0	8.0	9.0	1.4
Nereis succinea	1.0	0.	0.5	0.7
Oligochaeta spp.	18.0	18.0	18.0	0.
ARTHROPODA				
Ampelisca abdita	0.	2.0	1.0	1.4
Ostracoda sp.	1.0	0.	0.5	0.7
MOLLUSCA				
Gemma gemma	0.	1.0	0.5	0.7
Macoma balthica	2.0	3.0	2.5	0.7
Mya arenaria	1.0	2.0	1.5	0.7

SOUTHAMPTON

Date: 13/Aug/84 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	8.0	12.0	10.0	2.8
Nereis succinea	1.0	0.	0.5	0.7
Oligochaeta spp.	42.0	12.0	27.0	21.2
ARTHROPODA				
Ampelisca abdita	0.	1.0	0.5	0.7
Cirripedia sp.	3.0	1.0	2.0	1.4
Corophium sp.A	1.0	0.	0.5	0.7
MOLLUSCA				
Macoma balthica	4.0	5.0	4.5	0.7
Mya arenaria	2.0	4.0	3.0	1.4

SOUTHAMPTON

Date: 26/Sep/84 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	3.0	2.0	2.5	0.7
Oligochaeta spp.	15.0	14.0	14.5	0.7
Polydora ligni	1.0	0.	0.5	0.7
ARTHROPODA				
Corophium sp.B	1.0	0.	0.5	0.7
MOLLUSCA				
Macoma balthica	6.0	7.0	6.5	0.7
Mya arenaria	4.0	5.0	4.5	0.7

SOUTHAMPTON

Date: 22/Oct/84 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	2.0	6.0	4.0	2.8
Nereis succinea	3.0	1.0	2.0	1.4
Oligochaeta spp.	434.0	246.0	340.0	132.9
Polydora ligni	2.0	0.	1.0	1.4
MOLLUSCA				
Macoma balthica	6.0	2.0	4.0	2.8
Mya arenaria	5.0	1.0	3.0	2.8

SOUTHAMPTON

Date: 18/Dec/84 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	1.0	4.0	2.5	2.1
Nereis succinea	1.0	2.0	1.5	0.7
Oligochaeta spp.	131.0	357.0	244.0	159.8
Polydora ligni	4.0	2.0	3.0	1.4
Streblospio benedicti	1.0	0.	0.5	0.7
ARTHROPODA				
Grandidierella japonica	1.0	0.	0.5	0.7
MOLLUSCA				
Gemma gemma	5.0	0.	2.5	3.5
Macoma balthica	2.0	4.0	3.0	1.4
Mya arenaria	1.0	2.0	1.5	0.7

SOUTHAMPTON

Date: 16/Jan/85 Sample size = 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	0.	1.0	0.5	0.7
Nereis succinea	2.0	0.	1.0	1.4
Oligochaeta spp.	113.0	141.0	127.0	19.8
Polydora ligni	3.0	0.	1.5	2.1
MOLLUSCA				
Gemma gemma	0.	3.0	1.5	2.1
Macoma balthica	2.0	2.0	2.0	0.
Mya arenaria	0.	1.0	0.5	0.7

Table 3. *Species count data collected at San Pablo sampling station (Site 2) with a 16.5 x 10 centimeter can core from January 1983 through January 1985*

SAN PABLO

Date: 6/Jan/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	20.0	15.0	17.5	3.5
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	29.0	35.0	32.0	4.2
Streblospio benedicti	6.0	7.0	6.5	0.7
ARTHROPODA				
Corophium sp.B	0.	4.0	2.0	2.8
MOLLUSCA				
Macoma balthica	26.0	2.0	14.0	17.0
Mya arenaria	1.0	0.	0.5	0.7
MISC.				
Nematoda spp.	0.	1.0	0.5	0.7

SAN PABLO

Date: 7/Feb/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	0.	1.0	0.5	0.7
Heteromastus filiformis	1.0	1.0	1.0	0.
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	97.0	118.0	107.5	14.8
Streblospio benedicti	2.0	2.0	2.0	0.
MOLLUSCA				
Gemma gemma	5.0	1.0	3.0	2.8
Macoma balthica	20.0	12.0	16.0	5.7
Mya arenaria	1.0	2.0	1.5	0.7
MISC.				
Nematoda spp.	0.	1.0	0.5	0.7
Nemertea sp.	1.0	0.	0.5	0.7

SAN PABLO

Date: 7/Mar/83 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Heteromastus filiformis	2.0	0.	1.0	1.4
Nereis succinea	0.	2.0	1.0	1.4
Oligochaeta spp.	149.0	226.0	187.5	54.4
Streblospio benedicti	0.	4.0	2.0	2.8
ARTHROPODA				
Corophium sp.B	0.	7.0	3.5	4.9
Corophium spp.	0.	2.0	1.0	1.4
Liljeborgiidae sp.	3.0	0.	1.5	2.1
MOLLUSCA				
Macoma balthica	12.0	4.0	8.0	5.7
Mya arenaria	2.0	1.0	1.5	0.7

SAN PABLO

Date: 5/Apr/83 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	1.0	1.0	1.0	0.
Oligochaeta spp.	177.0	156.0	166.5	14.8
ARTHROPODA				
Corophium sp.B	5.0	0.	2.5	3.5
MISC.				
Nemertea sp.	0.	1.0	0.5	0.7

SAN PABLO

Date: 2/May/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	2.0	0.	1.0	1.4
Oligochaeta spp.	81.0	189.0	135.0	76.4
ARTHROPODA				
Corophium spp.	8.0	0.	4.0	5.7
Corophium sp.B	29.0	1.0	15.0	19.8
MOLLUSCA				
Macoma balthica	5.0	5.0	5.0	0.

SAN PABLO

Date: 2/Jun/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	1.0	3.0	2.0	1.4
Oligochaeta spp.	41.0	39.0	40.0	1.4
ARTHROPODA				
Corophium spp.	2.0	111.0	56.5	77.1
Corophium sp.B	2.0	417.0	209.5	293.4
MOLLUSCA				
Macoma balthica	3.0	2.0	2.5	0.7

SAN PABLO

Date: 14/Jul/83 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	1.0	0.	0.5	0.7
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	169.0	263.0	216.0	66.5
ARTHROPODA				
Chironomidae larvae	2.0	0.	1.0	1.4
MOLLUSCA				
Macoma balthica	9.0	4.0	6.5	3.5
MISC.				
Nematoda spp.	0.	1.0	0.5	0.7

SAN PABLO

Date: 12/Aug/83 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Heteromastus filiformis	0.	1.0	0.5	0.7
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	133.0	427.0	280.0	207.9
ARTHROPODA				
Chironomidae larvae	2.0	0.	1.0	1.4
Corophium acherusicum	1.0	0.	0.5	0.7
Corophium spp.	11.0	0.	5.5	7.8
Corophium sp.B	14.0	1.0	7.5	9.2
MOLLUSCA				
Macoma balthica	3.0	12.0	7.5	6.4

SAN PABLO

Date: 9/Sep/83 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	6.0	3.0	4.5	2.1
Nereis succinea	2.0	3.0	2.5	0.7
Oligochaeta spp.	310.0	135.0	222.5	123.7
Polydora ligni	1.0	0.	0.5	0.7
ARTHROPODA				
Cirripedia sp.	4.0	2.0	3.0	1.4
Corophium sp.B	0.	2.0	1.0	1.4
Synidotea laticauda	7.0	0.	3.5	4.9
MOLLUSCA				
Macoma balthica	13.0	10.0	11.5	2.1

SAN PABLO

Date: 3/Oct/83 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	1.0	3.0	2.0	1.4
Nereis succinea	7.0	6.0	6.5	0.7
Oligochaeta spp.	108.0	96.0	102.0	8.5
Polydora ligni	0.	1.0	0.5	0.7
ARTHROPODA				
Grandidierella japonica	0.	16.0	8.0	11.3
Hemigrapsus oregonensis	0.	5.0	2.5	3.5
Synidotea laticauda	0.	10.0	5.0	7.1
MOLLUSCA				
Macoma balthica	12.0	12.0	12.0	0.
Mya arenaria	1.0	10.0	5.5	6.4
MISC.				
Nematoda spp.	2.0	0.	1.0	1.4

SAN PABLO

Date: 1/Nov/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	6.0	8.0	7.0	1.4
Nereis succinea	4.0	6.0	5.0	1.4
Oligochaeta spp.	214.0	203.0	208.5	7.8
Streblospio benedicti	0.	1.0	0.5	0.7
ARTHROPODA				
Corophium acherusicum	1.0	2.0	1.5	0.7
Corophium spp.	1.0	1.0	1.0	0.
Grandidierella japonica	0.	3.0	1.5	2.1
Synidotea laticauda	1.0	5.0	3.0	2.8
MOLLUSCA				
Macoma balthica	12.0	10.0	11.0	1.4
Mya arenaria	0.	3.0	1.5	2.1
MISC.				
Nematoda spp.	0.	5.0	2.5	3.5

SAN PABLO

Date: 15/Dec/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	6.0	3.0	4.5	2.1
Nereis succinea	13.0	7.0	10.0	4.2
Oligochaeta spp.	149.0	266.0	207.5	82.7
ARTHROPODA				
Chironomidae larvae	2.0	1.0	1.5	0.7
Corophium sp.B	4.0	1.0	2.5	2.1
Grandidierella japonica	3.0	3.0	3.0	0.
MOLLUSCA				
Gastropoda sp.	1.0	0.	0.5	0.7
Macoma balthica	6.0	17.0	11.5	7.8
Mya arenaria	3.0	5.0	4.0	1.4
MISC.				
Nematoda spp.	2.0	0.	1.0	1.4

SAN PABLO

Date: 26/Jan/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	4.0	9.0	6.5	3.5
Oligochaeta spp.	84.0	77.0	80.5	4.9
ARTHROPODA				
Corophium sp.B	0.	2.0	1.0	1.4
Grandidierella japonica	0.	1.0	0.5	0.7
MOLLUSCA				
Macoma balthica	15.0	5.0	10.0	7.1
Mya arenaria	5.0	2.0	3.5	2.1
MISC.				
Nematoda spp.	0.	1.0	0.5	0.7

SAN PABLO

Date: 22/Feb/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Heteromastus filiformis	1.0	0.	0.5	0.7
Nereis succinea	8.0	7.0	7.5	0.7
Oligochaeta spp.	215.0	121.0	168.0	66.5
Streblospio benedicti	1.0	0.	0.5	0.7
ARTHROPODA				
Caridea sp.	0.	1.0	0.5	0.7
Corophium spp.	1.0	0.	0.5	0.7
MOLLUSCA				
Gemma gemma	1.0	1.0	1.0	0.
Macoma balthica	8.0	10.0	9.0	1.4
Mya arenaria	0.	1.0	0.5	0.7
MISC.				
Nemertea sp.	6.0	2.0	4.0	2.8

SAN PABLO

Date: 22/Mar/84 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	18.0	24.0	21.0	4.2
Oligochaeta spp.	51.0	151.0	101.0	70.7
Streblospio benedicti	1.0	1.0	1.0	0.
ARTHROPODA				
Liljeborgiidae sp.	0.	2.0	1.0	1.4
Synidotea laticauda	0.	1.0	0.5	0.7
MOLLUSCA				
Macoma balthica	12.0	4.0	8.0	5.7
Mya arenaria	1.0	2.0	1.5	0.7
MISC.				
Nematoda spp.	0.	2.0	1.0	1.4

SAN PABLO

Date: 19/Apr/84 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Nereis succinea	23.0	17.0	20.0	4.2
Oligochaeta spp.	24.0	135.0	79.5	78.5
ARTHROPODA				
Corophium acherusicum	0.	1.0	0.5	0.7
Corophium sp.B	0.	2.0	1.0	1.4
Grandidierella japonica	0.	1.0	0.5	0.7
MOLLUSCA				
Macoma balthica	7.0	7.0	7.0	0.
MISC.				
Nemertea sp.	1.0	0.	0.5	0.7

SAN PABLO

Date: 21/May/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	18.0	1.0	9.5	12.0
Nereis succinea	12.0	17.0	14.5	3.5
Oligochaeta spp.	45.0	25.0	35.0	14.1
Streblospio benedicti	1.0	0.	0.5	0.7
MOLLUSCA				
Macoma balthica	14.0	4.0	9.0	7.1
Mya arenaria	0.	1.0	0.5	0.7

SAN PABLO

Date: 19/Jun/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	13.0	10.0	11.5	2.1
Nereis succinea	7.0	9.0	8.0	1.4
Oligochaeta spp.	15.0	16.0	15.5	0.7
Streblospio benedicti	2.0	2.0	2.0	0.
MOLLUSCA				
Macoma balthica	15.0	12.0	13.5	2.1
MISC.				
Nemertea sp.	1.0	0.	0.5	0.7

SAN PABLO

Date: 17/Jul/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	0.	9.0	4.5	6.4
Nereis succinea	6.0	6.0	6.0	0.
Oligochaeta spp.	3.0	12.0	7.5	6.4
Streblospio benedicti	1.0	7.0	4.0	4.2
ARTHROPODA				
Ampelisca abdita	1.0	0.	0.5	0.7
Grandidierella japonica	0.	1.0	0.5	0.7
MOLLUSCA				
Macoma balthica	11.0	13.0	12.0	1.4
MISC.				
Nematoda spp.	0.	1.0	0.5	0.7

SAN PABLO

Date: 13/Aug/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	5.0	4.0	4.5	0.7
Nereis succinea	7.0	3.0	5.0	2.8
Oligochaeta spp.	3.0	4.0	3.5	0.7
Streblospio benedicti	2.0	8.0	5.0	4.2
ARTHROPODA				
Ampelisca abdita	0.	1.0	0.5	0.7
Corophium acherusicum	0.	1.0	0.5	0.7
Corophium spp.	0.	1.0	0.5	0.7
Grandidierella japonica	1.0	0.	0.5	0.7
MOLLUSCA				
Gemma gemma	1.0	0.	0.5	0.7
Macoma balthica	12.0	6.0	9.0	4.2

SAN PABLO

Date: 26/Sep/84 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	9.0	7.0	8.0	1.4
Nereis succinea	9.0	12.0	10.5	2.1
Oligochaeta spp.	6.0	2.0	4.0	2.8
Streblospio benedicti	8.0	10.0	9.0	1.4
ARTHROPODA				
Ampelisca abdita	0.	3.0	1.5	2.1
Corophium spp.	0.	1.0	0.5	0.7
Grandidierella japonica	0.	2.0	1.0	1.4
Synidotea laticauda	0.	1.0	0.5	0.7
MOLLUSCA				
Macoma balthica	20.0	10.0	15.0	7.1

SAN PABLO

Date: 22/Oct/84 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	8.0	4.0	6.0	2.8
Nereis succinea	7.0	7.0	7.0	0.
Oligochaeta spp.	12.0	5.0	8.5	4.9
Streblospio benedicti	7.0	3.0	5.0	2.8
ARTHROPODA				
Ampelisca abdita	2.0	0.	1.0	1.4
Cirripedia sp.	2.0	0.	1.0	1.4
Grandidierella japonica	2.0	0.	1.0	1.4
Hyalidae sp.	0.	1.0	0.5	0.7
MOLLUSCA				
Boonea sp.	1.0	0.	0.5	0.7
Gemma gemma	1.0	3.0	2.0	1.4
Macoma balthica	10.0	21.0	15.5	7.8

SAN PABLO

Date: 18/Dec/84 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	2.0	2.0	2.0	0.
Nereis succinea	4.0	8.0	6.0	2.8
Oligochaeta spp.	0.	1.0	0.5	0.7
Streblospio benedicti	4.0	4.0	4.0	0.
ARTHROPODA				
Sphaeroma quoyana	0.	1.0	0.5	0.7
Synidotea laticauda	0.	1.0	0.5	0.7
MOLLUSCA				
Gemma gemma	3.0	0.	1.5	2.1
Macoma balthica	9.0	12.0	10.5	2.1

SAN PABLO

Date: 16/Jan/85 Sample size = 0.17m2

SPECIES	SAMPLE 1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	2.0	1.0	1.5	0.7
Heteromastus filiformis	3.0	2.0	2.5	0.7
Nereis succinea	10.0	3.0	6.5	4.9
Oligochaeta spp.	6.0	0.	3.0	4.2
Streblospio benedicti	16.0	6.0	11.0	7.1
ARTHROPODA				
Grandidierella japonica	2.0	1.0	1.5	0.7
MOLLUSCA				
Gemma gemma	1.0	1.0	1.0	0.
Macoma balthica	1.0	6.0	3.5	3.5
MISC.				
Nematoda spp.	1.0	0.	0.5	0.7

Table 4. *Species count data collected at Hayward sampling station (Site 3) with a 16.5 x 10 centimeter can core from January 1983 through January 1985*

HAYWARD

Date: 10/Jan/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	4.0	1.0	2.5	2.1
Heteromastus filiformis	20.0	19.0	19.5	0.7
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	3.0	3.0	3.0	0.
Streblospio benedicti	11.0	15.0	13.0	2.8
ARTHROPODA				
Cumella vulgaris	1.0	1.0	1.0	0.
Grandidierella japonica	1.0	13.0	7.0	8.5
MOLLUSCA				
Boonea sp.	0.	1.0	0.5	0.7
Gemma gemma	167.0	121.0	144.0	32.5
Macoma balthica	17.0	13.0	15.0	2.8
Mya arenaria	1.0	5.0	3.0	2.8

HAYWARD

Date: 8/Feb/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	3.0	3.0	3.0	0.
Heteromastus filiformis	23.0	23.0	23.0	0.
Oligochaeta spp.	3.0	3.0	3.0	0.
Pseudopolydora kempi	1.0	1.0	1.0	0.
ARTHROPODA				
Cumella vulgaris	12.0	11.0	11.5	0.7
Grandidierella japonica	3.0	6.0	4.5	2.1
MOLLUSCA				
Gemma gemma	257.0	289.0	273.0	22.6
Macoma balthica	23.0	22.0	22.5	0.7
Mya arenaria	2.0	5.0	3.5	2.1

HAYWARD

Date: 8/Mar/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	7.0	6.0	6.5	0.7
Heteromastus filiformis	19.0	19.0	19.0	0.
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	11.0	1.0	6.0	7.1
Pseudopolydora kempi	0.	1.0	0.5	0.7
Streblospio benedicti	18.0	12.0	15.0	4.2
ARTHROPODA				
Ampelisca abdita	0.	1.0	0.5	0.7
Grandidierella japonica	1.0	0.	0.5	0.7
MOLLUSCA				
Boonea sp.	0.	1.0	0.5	0.7
Gemma gemma	200.0	209.0	204.5	6.4
Macoma balthica	17.0	13.0	15.0	2.8
Mya arenaria	3.0	1.0	2.0	1.4
Tapes japonica	2.0	0.	1.0	1.4

HAYWARD

Date: 6/Apr/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	1.0	0.	0.5	0.7
Heteromastus filiformis	19.0	15.0	17.0	2.8
Nematoda spp.	1.0	2.0	1.5	0.7
Oligochaeta spp.	0.	7.0	3.5	4.9
Pseudopolydora kempi	1.0	0.	0.5	0.7
Streblospio benedicti	5.0	10.0	7.5	3.5
MOLLUSCA				
Gemma gemma	18.0	18.0	18.0	0.
Ilynassa obsoleta	1.0	0.	0.5	0.7
Macoma balthica	11.0	16.0	13.5	3.5

HAYWARD

Date: 3/May/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	3.0	0.	1.5	2.1
Heteromastus filiformis	15.0	14.0	14.5	0.7
Nematoda spp.	0.	1.0	0.5	0.7
Oligochaeta spp.	31.0	9.0	20.0	15.6
Streblospio benedicti	15.0	11.0	13.0	2.8
ARTHROPODA				
Ampelisca abdita	0.	1.0	0.5	0.7
MOLLUSCA				
Gemma gemma	39.0	32.0	35.5	4.9
Macoma balthica	30.0	20.0	25.0	7.1
Mya arenaria	1.0	4.0	2.5	2.1

HAYWARD

Date: 1/Jun/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Heteromastus filiformis	11.0	10.0	10.5	0.7
Nematoda spp.	2.0	1.0	1.5	0.7
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	14.0	13.0	13.5	0.7
Streblospio benedicti	6.0	12.0	9.0	4.2
MOLLUSCA				
Boonea sp.	0.	1.0	0.5	0.7
Gemma gemma	93.0	67.0	80.0	18.4
Macoma balthica	27.0	23.0	25.0	2.8
Musculista senhousia	1.0	0.	0.5	0.7
Mya arenaria	0.	1.0	0.5	0.7

HAYWARD

Date: 15/Jul/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	0.	2.0	1.0	1.4
Heteromastus filiformis	15.0	11.0	13.0	2.8
Nematoda spp.	0.	4.0	2.0	2.8
Oligochaeta spp.	7.0	2.0	4.5	3.5
Pseudopolydora kempi	1.0	1.0	1.0	0.
Streblospio benedicti	6.0	6.0	6.0	0.
ARTHROPODA				
Ampelisca abdita	3.0	3.0	3.0	0.
Chironomidae larvae	0.	3.0	1.5	2.1
Cirripedia sp.	1.0	1.0	1.0	0.
Grandidierella japonica	1.0	3.0	2.0	1.4
MOLLUSCA				
Gemma gemma	43.0	47.0	45.0	2.8
Macoma balthica	14.0	20.0	17.0	4.2
Mya arenaria	0.	1.0	0.5	0.7

HAYWARD

Date: 11/Aug/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	3.0	4.0	3.5	0.7
Heteromastus filiformis	10.0	8.0	9.0	1.4
Nematoda spp.	9.0	4.0	6.5	3.5
Oligochaeta spp.	9.0	5.0	7.0	2.8
Streblospio benedicti	7.0	4.0	5.5	2.1
ARTHROPODA				
Ampelisca abdita	1.0	0.	0.5	0.7
Synidotea laticauda	0.	1.0	0.5	0.7
MOLLUSCA				
Gemma gemma	52.0	46.0	49.0	4.2
Macoma balthica	23.0	17.0	20.0	4.2
Mya arenaria	1.0	0.	0.5	0.7

HAYWARD

Date: 8/Sep/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	1.0	1.0	1.0	0.
Heteromastus filiformis	17.0	13.0	15.0	2.8
Nematoda spp.	1.0	0.	0.5	0.7
Oligochaeta spp.	15.0	5.0	10.0	7.1
Streblospio benedicti	32.0	10.0	21.0	15.6
ARTHROPODA				
Amphipoda juvenile	0.	1.0	0.5	0.7
Sphaeroma quoyana	2.0	0.	1.0	1.4
Grandidierella japonica	18.0	5.0	11.5	9.2
Synidotea laticauda	2.0	2.0	2.0	0.
MOLLUSCA				
Boonea sp.	1.0	0.	0.5	0.7
Gemma gemma	62.0	44.0	53.0	12.7
Macoma balthica	15.0	21.0	18.0	4.2
Mya arenaria	0.	1.0	0.5	0.7

HAYWARD

Date: 4/Oct/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	0.	3.0	1.5	2.1
Heteromastus filiformis	9.0	12.0	10.5	2.1
Oligochaeta spp.	8.0	26.0	17.0	12.7
Streblospio benedicti	1.0	1.0	1.0	0.
ARTHROPODA				
Grandidierella japonica	5.0	4.0	4.5	0.7
MOLLUSCA				
Gemma gemma	54.0	50.0	52.0	2.8
Macoma balthica	15.0	13.0	14.0	1.4
Mya arenaria	1.0	1.0	1.0	0.

HAYWARD

Date: 2/Nov/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	3.0	1.0	2.0	1.4
Heteromastus filiformis	11.0	7.0	9.0	2.8
Nematoda spp.	0.	2.0	1.0	1.4
Oligochaeta spp.	7.0	12.0	9.5	3.5
Streblospio benedicti	17.0	5.0	11.0	8.5
ARTHROPODA				
Grandidierella japonica	2.0	11.0	6.5	6.4
Synidotea laticauda	0.	2.0	1.0	1.4
MOLLUSCA				
Boonea sp.	1.0	0.	0.5	0.7
Gemma gemma	134.0	119.0	126.5	10.6
Macoma balthica	11.0	19.0	15.0	5.7
Mya arenaria	3.0	3.0	3.0	0.

HAYWARD

Date: 14/Dec/83 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	8.0	4.0	6.0	2.8
Heteromastus filiformis	15.0	14.0	14.5	0.7
Oligochaeta spp.	22.0	7.0	14.5	10.6
Pseudopolydora kempi	1.0	0.	0.5	0.7
Streblospio benedicti	39.0	36.0	37.5	2.1
ARTHROPODA				
Ampelisca abdita	1.0	2.0	1.5	0.7
Corophium spinicorne	1.0	0.	0.5	0.7
Cumella vulgaris	1.0	1.0	1.0	0.
Synidotea laticauda	0.	1.0	0.5	0.7
Tanais sp.	0.	1.0	0.5	0.7
MOLLUSCA				
Boonea sp.	0.	1.0	0.5	0.7
Gemma gemma	148.0	115.0	131.5	23.3
Macoma balthica	13.0	13.0	13.0	0.
Mya arenaria	3.0	0.	1.5	2.1

HAYWARD

Date: 25/Jan/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	4.0	4.0	4.0	0.
Heteromastus filiformis	13.0	14.0	13.5	0.7
Oligochaeta spp.	1.0	5.0	3.0	2.8
Pseudopolydora kempi	2.0	1.0	1.5	0.7
Streblospio benedicti	26.0	29.0	27.5	2.1
ARTHROPODA				
Asellota sp.	0.	2.0	1.0	1.4
Cumella vulgaris	0.	3.0	1.5	2.1
Sphaeroma quoyana	0.	3.0	1.5	2.1
MOLLUSCA				
Gemma gemma	164.0	231.0	197.5	47.4
Macoma balthica	9.0	15.0	12.0	4.2
Mya arenaria	3.0	0.	1.5	2.1

HAYWARD

Date: 23/Feb/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	8.0	10.0	9.0	1.4
Heteromastus filiformis	17.0	12.0	14.5	3.5
Nematoda spp.	0.	1.0	0.5	0.7
Oligochaeta spp.	6.0	18.0	12.0	8.5
Pseudopolydora kempi	0.	1.0	0.5	0.7
Streblospio benedicti	29.0	41.0	35.0	8.5
ARTHROPODA				
Cumella vulgaris	5.0	3.0	4.0	1.4
Grandidierella japonica	0.	1.0	0.5	0.7
MOLLUSCA				
Boonea sp.	0.	1.0	0.5	0.7
Gemma gemma	274.0	376.0	325.0	72.1
Macoma balthica	27.0	36.0	31.5	6.4

HAYWARD

Date: 23/Mar/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	6.0	6.0	6.0	0.
Heteromastus filiformis	11.0	19.0	15.0	5.7
Nematoda spp.	2.0	2.0	2.0	0.
Oligochaeta spp.	7.0	6.0	6.5	0.7
Pseudopolydora kempi	1.0	0.	0.5	0.7
Streblospio benedicti	10.0	7.0	8.5	2.1
ARTHROPODA				
Ampelisca abdita	0.	2.0	1.0	1.4
Cirripedia sp.	0.	4.0	2.0	2.8
Grandidierella japonica	1.0	4.0	2.5	2.1
MOLLUSCA				
Gemma gemma	203.0	189.0	196.0	9.9
Macoma balthica	22.0	29.0	25.5	4.9
Mya arenaria	1.0	0.	0.5	0.7

HAYWARD

Date: 23/Apr/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	20.0	12.0	16.0	5.7
Heteromastus filiformis	15.0	10.0	12.5	3.5
Nematoda spp.	2.0	0.	1.0	1.4
Oligochaeta spp.	22.0	12.0	17.0	7.1
Streblospio benedicti	34.0	19.0	26.5	10.6
ARTHROPODA				
Corophium spp.	0.	2.0	1.0	1.4
MOLLUSCA				
Boonea sp.	0.	1.0	0.5	0.7
Gemma gemma	376.0	302.0	339.0	52.3
Macoma balthica	42.0	40.0	41.0	1.4
Musculista senhousia	0.	1.0	0.5	0.7

HAYWARD

Date: 22/May/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	39.0	33.0	36.0	4.2
Heteromastus filiformis	7.0	15.0	11.0	5.7
Nematoda spp.	1.0	0.	0.5	0.7
Nereis succinea	0.	1.0	0.5	0.7
Oligochaeta spp.	9.0	9.0	9.0	0.
Streblospio benedicti	12.0	35.0	23.5	16.3
ARTHROPODA				
Cirripedia sp.	0.	1.0	0.5	0.7
Corophium spp.	1.0	0.	0.5	0.7
Corophium acherusicum	1.0	0.	0.5	0.7
Grandidierella japonica	0.	3.0	1.5	2.1
MOLLUSCA				
Gemma gemma	373.0	436.0	404.5	44.5
Macoma balthica	44.0	50.0	47.0	4.2
Musculista senhousia	0.	1.0	0.5	0.7
Mya arenaria	0.	1.0	0.5	0.7

HAYWARD

Date: 18/Jun/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	25.0	17.0	21.0	5.7
Heteromastus filiformis	15.0	8.0	11.5	4.9
Oligochaeta spp.	2.0	14.0	8.0	8.5
Streblospio benedicti	22.0	15.0	18.5	4.9
ARTHROPODA				
Ampelisca abdita	1.0	1.0	1.0	0.
Corophium acherusicum	0.	2.0	1.0	1.4
Grandidierella japonica	2.0	2.0	2.0	0.
Unidentified Amphipoda	1.0	0.	0.5	0.7
MOLLUSCA				
Boonea sp.	0.	1.0	0.5	0.7
Gemma gemma	235.0	258.0	246.5	16.3
Macoma balthica	34.0	47.0	40.5	9.2
Mya arenaria	1.0	0.	0.5	0.7

HAYWARD

Date: 18/Jul/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	3.0	19.0	11.0	11.3
Heteromastus filiformis	17.0	17.0	17.0	0.
Streblospio benedicti	2.0	3.0	2.5	0.7
ARTHROPODA				
Ampelisca abdita	299.0	356.0	327.5	40.3
Amphipoda juveniles	4.0	0.	2.0	2.8
Corophium acherusicum	0.	2.0	1.0	1.4
Corophium spp.	0.	4.0	2.0	2.8
Grandidierella japonica	29.0	62.0	45.5	23.3
Synidotea laticauda	0.	8.0	4.0	5.7
MOLLUSCA				
Gemma gemma	242.0	163.0	202.5	55.9
Macoma balthica	24.0	47.0	35.5	16.3

HAYWARD

Date: 15/Aug/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	2.0	7.0	4.5	3.5
Heteromastus filiformis	10.0	10.0	10.0	0.
Nereis succinea	1.0	0.	0.5	0.7
Oligochaeta spp.	2.0	0.	1.0	1.4
Streblospio benedicti	1.0	1.0	1.0	0.
ARTHROPODA				
Ampelisca abdita	387.0	383.0	385.0	2.8
Caridea sp.	0.	1.0	0.5	0.7
Corophium acherusicum	2.0	2.0	2.0	0.
Corophium spp.	1.0	10.0	5.5	6.4
Grandidierella japonica	57.0	81.0	69.0	17.0
Synidotea laticauda	5.0	3.0	4.0	1.4
MOLLUSCA				
Gemma gemma	181.0	165.0	173.0	11.3
Macoma balthica	26.0	19.0	22.5	4.9

HAYWARD

Date: 27/Sep/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	2.0	2.0	2.0	0.
Heteromastus filiformis	11.0	13.0	12.0	1.4
Oligochaeta spp.	4.0	14.0	9.0	7.1
Streblospio benedicti	5.0	5.0	5.0	0.
ARTHROPODA				
Corophium acherusicum	20.0	12.0	16.0	5.7
Corophium insidiosum	2.0	1.0	1.5	0.7
Corophium spp.	59.0	30.0	44.5	20.5
Grandidierella japonica	79.0	48.0	63.5	21.9
Ostracoda sp.	1.0	0.	0.5	0.7
MOLLUSCA				
Gemma gemma	194.0	209.0	201.5	10.6
Macoma balthica	34.0	20.0	27.0	9.9
Musculista senhousia	1.0	0.	0.5	0.7
Mya arenaria	3.0	0.	1.5	2.1

HAYWARD

Date: 23/Oct/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	1.0	0.	0.5	0.7
Eteone californica	1.0	2.0	1.5	0.7
Heteromastus filiformis	11.0	16.0	13.5	3.5
Oligochaeta spp.	7.0	9.0	8.0	1.4
Streblospio benedicti	2.0	3.0	2.5	0.7
ARTHROPODA				
Ostracoda sp.	1.0	0.	0.5	0.7
Synidotea laticauda	0.	1.0	0.5	0.7
MOLLUSCA				
Gemma gemma	414.0	456.0	435.0	29.7
Macoma balthica	25.0	32.0	28.5	4.9
Mya arenaria	0.	1.0	0.5	0.7

HAYWARD

Date: 19/Dec/84 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	2.0	3.0	2.5	0.7
Heteromastus filiformis	14.0	16.0	15.0	1.4
Nematoda spp.	1.0	0.	0.5	0.7
Oligochaeta spp.	1.0	1.0	1.0	0.
Streblospio benedicti	13.0	16.0	14.5	2.1
ARTHROPODA				
Cumella vulgaris	1.0	2.0	1.5	0.7
Grandidierella japonica	2.0	2.0	2.0	0.
MOLLUSCA				
Boonea sp.	0.	1.0	0.5	0.7
Gemma gemma	358.0	367.0	362.5	6.4
Macoma balthica	25.0	31.0	28.0	4.2
Tapes japonica	1.0	0.	0.5	0.7

HAYWARD

Date: 17/Jan/85 Sample size = 0.17m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	4.0	2.0	3.0	1.4
Heteromastus filiformis	11.0	19.0	15.0	5.7
Nematoda spp.	0.	1.0	0.5	0.7
Oligochaeta spp.	8.0	3.0	5.5	3.5
Pseudopolydora kempi	0.	1.0	0.5	0.7
Streblospio benedicti	16.0	14.0	15.0	1.4
ARTHROPODA				
Cumella vulgaris	2.0	0.	1.0	1.4
Grandidierella japonica	6.0	4.0	5.0	1.4
MOLLUSCA				
Gemma gemma	489.0	414.0	451.5	53.0
Macoma balthica	36.0	32.0	34.0	2.8
Mya arenaria	1.0	1.0	1.0	0.
Tapes japonica	1.0	0.	0.5	0.7

Table 5. *Species count data collected at Palo Alto sampling station (Site 4) with a 16.5 x 10 centimeter van core from January 1983 through January 1985*

PALO ALTO

Date: 11/Jan/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	4.0	10.0	7.0	4.2
Heteromastus filiformis	15.0	18.0	16.5	2.1
Nereis succinea	2.0	3.0	2.5	0.7
Oligochaeta spp.	14.0	4.0	9.0	7.1
Streblospio benedicti	38.0	67.0	52.5	20.5
ARTHROPODA				
Ampelisca abdita	1.0	0.	0.5	0.7
Cumella vulgaris	1.0	0.	0.5	0.7
Cyprideis sp.	1.0	0.	0.5	0.7
Grandidierella japonica	2.0	1.0	1.5	0.7
MOLLUSCA				
Boonea sp.	4.0	6.0	5.0	1.4
Gemma gemma	148.0	183.0	165.5	24.7
Macoma balthica	12.0	13.0	12.5	0.7
Mya arenaria	1.0	2.0	1.5	0.7

PALO ALTO

Date: 9/Feb/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	0.	1.0	0.5	0.7
Eteone californica	6.0	7.0	6.5	0.7
Heteromastus filiformis	26.0	27.0	26.5	0.7
Nereis succinea	1.0	2.0	1.5	0.7
Oligochaeta spp.	4.0	1.0	2.5	2.1
Streblospio benedicti	34.0	23.0	28.5	7.8
ARTHROPODA				
Corophium acherusicum	2.0	0.	1.0	1.4
MOLLUSCA				
Boonea sp.	2.0	3.0	2.5	0.7
Gemma gemma	80.0	98.0	89.0	12.7
Macoma balthica	18.0	0.0	9.0	12.7
Mya arenaria	0.	2.0	1.0	1.4

PALO ALTO

Date: 10/Mar/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	4.0	4.0	4.0	0.
Heteromastus filiformis	22.0	23.0	22.5	0.7
Nereis succinea	2.0	5.0	3.5	2.1
Oligochaeta spp.	20.0	15.0	17.5	3.5
Streblospio benedicti	22.0	20.0	21.0	1.4
ARTHROPODA				
Ampelisca abdita	0.	1.0	0.5	0.7
MOLLUSCA				
Boonea sp.	4.0	0.	2.0	2.8
Gemma gemma	65.0	74.0	69.5	6.4
Macoma balthica	14.0	12.0	13.0	1.4

PALO ALTO

Date: 7/Apr/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	4.0	1.0	2.5	2.1
Heteromastus filiformis	24.0	22.0	23.0	1.4
Nereis succinea	6.0	2.0	4.0	2.8
Oligochaeta spp.	34.0	29.0	31.5	3.5
Streblospio benedicti	37.0	45.0	41.0	5.7
ARTHROPODA				
Cyprideis sp.	0.	5.0	2.5	3.5
Melita sp.	0.	1.0	0.5	0.7
MOLLUSCA				
Boonea sp.	3.0	4.0	3.5	0.7
Gemma gemma	33.0	38.0	35.5	3.5
Macoma balthica	33.0	28.0	30.5	3.5
Mya arenaria	1.0	0.	0.5	0.7

PALO ALTO

Date: 4/May/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	2.0	0.	1.0	1.4
Heteromastus filiformis	23.0	23.0	23.0	0.
Nereis succinea	1.0	6.0	3.5	3.5
Oligochaeta spp.	32.0	19.0	25.5	9.2
Streblospio benedicti	86.0	73.0	79.5	9.2
ARTHROPODA				
Ampelisca abdita	1.0	0.	0.5	0.7
MOLLUSCA				
Boonea sp.	5.0	3.0	4.0	1.4
Gemma gemma	21.0	7.0	14.0	9.9
Macoma balthica	33.0	21.0	27.0	8.5
Mya arenaria	1.0	2.0	1.5	0.7
MISC.				
Nematoda	1.0	1.0	1.0	0.

PALO ALTO

Date: 3/Jun/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	0.	1.0	0.5	0.7
Heteromastus filiformis	29.0	25.0	27.0	2.8
Nereis succinea	6.0	5.0	5.5	0.7
Oligochaeta spp.	127.0	99.0	113.0	19.8
Streblospio benedicti	75.0	60.0	67.5	10.6
ARTHROPODA				
Cirripedia	2.0	0.	1.0	1.4
Corophium acherusicum	0.	1.0	0.5	0.7
Corophium spp.	1.0	0.	0.5	0.7
Grandidierella japonica	1.0	0.	0.5	0.7
MOLLUSCA				
Boonea sp.	0.	8.0	4.0	5.7
Gemma gemma	16.0	28.0	22.0	8.5
Macoma balthica	25.0	16.0	20.5	6.4
Mya arenaria	1.0	1.0	1.0	0.
MISC.				
Nematoda	15.0	35.0	25.0	14.1

PALO ALTO

Date: 13/Jul/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	3.0	9.0	6.0	4.2
Heteromastus filiformis	26.0	34.0	30.0	5.7
Nereis succinea	4.0	4.0	4.0	0.
Oligochaeta spp.	121.0	66.0	93.5	38.9
Streblospio benedicti	42.0	16.0	29.0	18.4
ARTHROPODA				
Ampelisca abdita	23.0	31.0	27.0	5.7
Grandidierella japonica	1.0	2.0	1.5	0.7
MOLLUSCA				
Gemma gemma	19.0	30.0	24.5	7.8
Macoma balthica	39.0	42.0	40.5	2.1
Mya arenaria	1.0	0.	0.5	0.7
MISC.				
Nematoda	27.0	4.0	15.5	16.3

PALO ALTO

Date: 10/Aug/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Heteromastus filiformis	12.0	8.0	10.0	2.8
Nereis succinea	3.0	3.0	3.0	0.
Oligochaeta spp.	20.0	29.0	24.5	6.4
Streblospio benedicti	2.0	1.0	1.5	0.7
ARTHROPODA				
Ampelisca abdita	108.0	128.0	118.0	14.1
Cirripedia sp.	1.0	0.	0.5	0.7
Grandidierella japonica	2.0	2.0	2.0	0.
MOLLUSCA				
Gemma gemma	19.0	26.0	22.5	4.9
Macoma balthica	30.0	49.0	39.5	13.4
Mya arenaria	0.	2.0	1.0	1.4

PALO ALTO

Date: 7/Sep/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	4.0	4.0	4.0	0.
Heteromastus	filiformis	30.0	25.0	27.5
Nereis succinea	1.0	3.0	2.0	1.4
Oligochaeta spp.	58.0	60.0	59.0	1.4
Streblospio benedicti	30.0	14.0	22.0	11.3
ARTHROPODA				
Ampelisca abdita	249.0	339.0	294.0	63.6
Corophium acherusicum	0.	6.0	3.0	4.2
Grandidierella japonica	27.0	12.0	19.5	10.6
MOLLUSCA				
Boonea sp.	0.	2.0	1.0	1.4
Gemma gemma	139.0	144.0	141.5	3.5
Macoma balthica	40.0	38.0	39.0	1.4
Mya arenaria	7.0	13.0	10.0	4.2

PALO ALTO

Date: 5/Oct/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	10.0	7.0	8.5	2.1
Heteromastus filiformis	17.0	35.0	26.0	12.7
Nereis succinea	2.0	2.0	2.0	0.
Oligochaeta spp.	154.0	245.0	199.5	64.3
Polydora ligni	0.	1.0	0.5	0.7
Streblospio benedicti	35.0	26.0	30.5	6.4
ARTHROPODA				
Ampelisca abdita	137.0	124.0	130.5	9.2
Corophium acherusicum	1.0	0.	0.5	0.7
Corophium spp.	1.0	0.	0.5	0.7
Grandidierella japonica	10.0	9.0	9.5	0.7
Synidotea laticauda	4.0	1.0	2.5	2.1
MOLLUSCA				
Boonea sp.	1.0	0.	0.5	0.7
Gemma gemma	659.0	584.0	621.5	53.0
Macoma balthica	32.0	25.0	28.5	4.9
Mya arenaria	11.0	8.0	9.5	2.1
MISC.				
Nematoda	1.0	0.0	0.5	0.7

PALO ALTO

Date: 3/Nov/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella	"capitata"	2.0	0.	1.0
Eteone californica	7.0	4.0	5.5	2.1
Heteromastus filiformis	25.0	21.0	23.0	2.8
Nereis succinea	3.0	2.0	2.5	0.7
Oligochaeta spp.	100.0	82.0	91.0	12.7
Streblospio benedicti	43.0	19.0	31.0	17.0
ARTHROPODA				
Ampelisca abdita	98.0	99.0	98.5	0.7
Corophium spp.	1.0	0.	0.5	0.7
Synidotea laticauda	3.0	8.0	5.5	3.5
MOLLUSCA				
Boonea sp.	0.	3.0	1.5	2.1
Gemma gemma	1002.0	868.0	935.0	94.8
Macoma balthica	19.0	30.0	24.5	7.8
Musculista senhousia	2.0	3.0	2.5	0.7
Mya arenaria	5.0	5.0	5.0	0.

PALO ALTO

Date: 16/Dec/83 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	3.0	2.0	2.5	0.7
Eteone californica	4.0	8.0	6.0	2.8
Heteromastus filiformis	29.0	31.0	30.0	1.4
Nereis succinea	1.0	2.0	1.5	0.7
Oligochaeta spp.	138.0	210.0	174.0	50.9
Streblospio benedicti	41.0	34.0	37.5	4.9
ARTHROPODA				
Ampelisca abdita	1.0	14.0	7.5	9.2
Corophium acherusicum	0.	1.0	0.5	0.7
MOLLUSCA				
Boonea sp.	1.0	3.0	2.0	1.4
Gemma gemma	665.0	652.0	658.5	9.2
Macoma balthica	19.0	23.0	21.0	2.8
Musculista senhousia	1.0	0.	0.5	0.7
Mya arenaria	5.0	9.0	7.0	2.8
MISC.				
Nematoda	0.	1.0	0.5	0.7

PALO ALTO

Date: 24/Jan/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	0.	9.0	4.5	6.4
Eteone californica	3.0	7.0	5.0	2.8
Heteromastus filiformis	17.0	20.0	18.5	2.1
Nereis succinea	1.0	3.0	2.0	1.4
Oligochaeta spp.	133.0	84.0	108.5	34.6
Streblospio benedicti	64.0	41.0	52.5	16.3
ARTHROPODA				
Ampelisca abdita	5.0	4.0	4.5	0.7
Corophium acherusicum	0.	1.0	0.5	0.7
Grandidierella japonica	3.0	2.0	2.5	0.7
MOLLUSCA				
Boonea sp.	1.0	1.0	1.0	0.
Gemma gemma	989.0	913.0	951.0	53.7
Macoma balthica	31.0	30.0	30.5	0.7
Mya arenaria	10.0	7.0	8.5	2.1
MISC.				
Nematoda	1.0	2.0	1.5	0.7

PALO ALTO

Date: 21/Feb/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	2.0	3.0	2.5	0.7
Eteone californica	13.0	9.0	11.0	2.8
Heteromastus filiformis	26.0	30.0	28.0	2.8
Nereis succinea	2.0	3.0	2.5	0.7
Oligochaeta spp.	131.0	141.0	136.0	7.1
Streblospio benedicti	45.0	39.0	42.0	4.2
ARTHROPODA				
Ampelisca abdita	1.0	4.0	2.5	2.1
Cirripedia sp.	1.0	0.	0.5	0.7
Grandidierella japonica	0.	1.0	0.5	0.7
MOLLUSCA				
Boonea sp.	0.	3.0	1.5	2.1
Gemma gemma	939.0	722.0	830.5	153.4
Macoma balthica	28.0	33.0	30.5	3.5
Mya arenaria	5.0	2.0	3.5	2.1
MISC.				
Nematoda	0.0	2.0	1.0	1.4

PALO ALTO

Date: 20/Mar/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	4.0	0.	2.0	2.8
Eteone californica	9.0	6.0	7.5	2.1
Heteromastus filiformis	20.0	0.	10.0	14.1
Nereis succinea	0.	2.0	1.0	1.4
Oligochaeta spp.	156.0	108.0	132.0	33.9
Streblospio benedicti	21.0	5.0	13.0	11.3
ARTHROPODA				
Ampelisca abdita	1.0	3.0	2.0	1.4
Corophium spp.	1.0	0.	0.5	0.7
Grandidierella japonica	1.0	0.	0.5	0.7
MOLLUSCA				
Boonea sp.	1.0	0.	0.5	0.7
Gemma gemma	413.0	435.0	424.0	15.6
Macoma balthica	26.0	29.0	27.5	2.1
Mya arenaria	1.0	2.0	1.5	0.7
MISC.				
Nematoda	1.0	0.	0.5	0.7

PALO ALTO

Date: 20/Apr/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	8.0	3.0	5.5	3.5
Eteone californica	11.0	12.0	11.5	0.7
Heteromastus filiformis	28.0	28.0	28.0	0.
Nereis succinea	4.0	2.0	3.0	1.4
Oligochaeta spp.	115.0	124.0	119.5	6.4
Streblospio benedicti	14.0	8.0	11.0	4.2
ARTHROPODA				
Cirripedia sp.	2.0	0.	1.0	1.4
Grandidierella japonica	1.0	0.	0.5	0.7
MOLLUSCA				
Boonea sp.	2.0	1.0	1.5	0.7
Gemma gemma	412.0	367.0	389.5	31.8
Macoma balthica	35.0	35.0	35.0	0.
Mya arenaria	6.0	2.0	4.0	2.8
MISC.				
Nematoda	2.0	2.0	2.0	0.0

PALO ALTO

Date: 18/May/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
CNIDARIA				
Anthozoa sp.	1.0	0.	0.5	0.7
ANNELIDA				
Capitella "capitata"	3.0	0.	1.5	2.1
Eteone californica	58.0	0.	29.0	41.0
Heteromastus filiformis	25.0	12.0	18.5	9.2
Nereis succinea	2.0	4.0	3.0	1.4
Oligochaeta spp.	129.0	90.0	109.5	27.6
Streblospio benedicti	25.0	8.0	16.5	12.0
ARTHROPODA				
Ampelisca abdita	7.0	3.0	5.0	2.8
Amphipoda (unidentified)	1.0	0.	0.5	0.7
Grandidierella japonica	3.0	1.0	2.0	1.4
MOLLUSCA				
Boonea sp.	1.0	2.0	1.5	0.7
Gemma gemma	195.0	195.0	195.0	0.
Macoma balthica	29.0	37.0	33.0	5.7
Mya arenaria	8.0	3.0	5.5	3.5
MISC.				
Nematoda	6.0	0.	3.0	4.2

PALO ALTO

Date: 20/Jun/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	0.	3.0	1.5	2.1
Eteone californica	21.0	49.0	35.0	19.8
Heteromastus filiformis	29.0	31.0	30.0	1.4
Nereis succinea	2.0	0.	1.0	1.4
Oligochaeta spp.	21.0	54.0	37.5	23.3
Polydora ligni	0.	2.0	1.0	1.4
Streblospio benedicti	21.0	27.0	24.0	4.2
ARTHROPODA				
Ampelisca abdita	130.0	225.0	177.5	67.2
Corophium acherusicum	1.0	3.0	2.0	1.4
Corophium spp.	2.0	2.0	2.0	0.
Grandidierella japonica	77.0	65.0	71.0	8.5
MOLLUSCA				
Gemma gemma	152.0	234.0	193.0	58.0
Macoma balthica	30.0	40.0	35.0	7.1
Mya arenaria	4.0	13.0	8.5	6.4

PALO ALTO

Date: 19/Jul/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	0.	1.0	0.5	0.7
Eteone californica	20.0	8.0	14.0	8.5
Heteromastus filiformis	32.0	19.0	25.5	9.2
Nereis succinea	2.0	1.0	1.5	0.7
Oligochaeta spp.	12.0	20.0	16.0	5.7
Streblospio benedicti	3.0	4.0	3.5	0.7
ARTHROPODA				
Ampelisca abdita	118.0	213.0	165.5	67.2
MOLLUSCA				
Gemma gemma	70.0	152.0	111.0	58.0
Macoma balthica	20.0	33.0	26.5	9.2
Mya arenaria	4.0	4.0	4.0	0.

PALO ALTO

Date: 14/Aug/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Eteone californica	12.0	12.0	12.0	0.
Heteromastus filiformis	19.0	12.0	15.5	4.9
Nereis succinea	1.0	1.0	1.0	0.
Oligochaeta spp.	43.0	33.0	38.0	7.1
Streblospio benedicti	5.0	3.0	4.0	1.4
ARTHROPODA				
Ampelisca abdita	264.0	357.0	310.5	65.8
Corophium acherusicum	11.0	12.0	11.5	0.7
Corophium spp.	10.0	23.0	16.5	9.2
Grandidierella japonica	94.0	96.0	95.0	1.4
Synidotea laticauda	1.0	1.0	1.0	0.
MOLLUSCA				
Boonea sp.	1.0	1.0	1.0	0.
Gemma gemma	108.0	473.0	290.5	258.1
Macoma balthica	26.0	58.0	42.0	22.6
Mya arenaria	2.0	1.0	1.5	0.7

PALO ALTO

Date: 28/Sep/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	1.0	3.0	2.0	1.4
Eteone californica	7.0	9.0	8.0	1.4
Heteromastus filiformis	20.0	10.0	15.0	7.1
Nereis succinea	1.0	1.0	1.0	0.
Oligochaeta spp.	180.0	67.0	123.5	79.9
Streblospio benedicti	31.0	8.0	19.5	16.3
ARTHROPODA				
Ampelisca abdita	6.0	5.0	5.5	0.7
Corophium acherusicum	4.0	1.0	2.5	2.1
Corophium spp.	0.	2.0	1.0	1.4
Grandidierella japonica	16.0	14.0	15.0	1.4
MOLLUSCA				
Boonea sp.	3.0	3.0	3.0	0.
Gemma gemma	745.0	934.0	839.5	133.6
Macoma balthica	51.0	55.0	53.0	2.8

PALO ALTO

Date: 24/Oct/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	2.0	3.0	2.5	0.7
Eteone californica	7.0	10.0	8.5	2.1
Heteromastus filiformis	33.0	31.0	32.0	1.4
Nereis succinea	1.0	0.	0.5	0.7
Oligochaeta spp.	123.0	201.0	162.0	55.2
Streblospio benedicti	20.0	0.	10.0	14.1
ARTHROPODA				
Ampelisca abdita	26.0	18.0	22.0	5.7
Corophium acherusicum	0.	3.0	1.5	2.1
Corophium spp.	2.0	0.	1.0	1.4
Sphaeroma quoyana	1.0	0.	0.5	0.7
Grandidierella japonica	6.0	6.0	6.0	0.
Synidotea laticauda	1.0	1.0	1.0	0.
MOLLUSCA				
Boonea sp.	0.	2.0	1.0	1.4
Gemma gemma	882.0	1182.0	1032.0	212.1
Macoma balthica	33.0	50.0	41.5	12.0
Mya arenaria	1.0	1.0	1.0	0.

PALO ALTO

Date: 20/Dec/84 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	3.0	3.0	3.0	0.
Eteone californica	10.0	5.0	7.5	3.5
Heteromastus filiformis	41.0	47.0	44.0	4.2
Oligochaeta spp.	163.0	35.0	99.0	90.5
Streblospio benedicti	43.0	28.0	35.5	10.6
ARTHROPODA				
Ampelisca abdita	23.0	19.0	21.0	2.8
Corophium acherusicum	11.0	4.0	7.5	4.9
Corophium insidiosum	3.0	1.0	2.0	1.4
Corophium spp.	23.0	9.0	16.0	9.9
Sphaeroma quoyana	1.0	0.	0.5	0.7
Grandidierella japonica	76.0	37.0	56.5	27.6
MOLLUSCA				
Boonea sp.	10.0	1.0	5.5	6.4
Gemma gemma	1323.0	1199.0	1261.0	87.7
Macoma balthica	34.0	52.0	43.0	12.7
Mya arenaria	0.	1.0	0.5	0.7
MISC.				
Nematoda	1.0	0.	0.5	0.7

PALO ALTO

Date: 15/Jan/85 Sample size: 0.017m2

SPECIES	SAMPLE			
	1	2	Mean	Standard Deviation
ANNELIDA				
Capitella "capitata"	5.0	4.0	4.5	0.7
Eteone californica	5.0	9.0	7.0	2.8
Heteromastus filiformis	47.0	51.0	49.0	2.8
Nereis succinea	2.0	1.0	1.5	0.7
Oligochaeta spp.	131.0	198.0	164.5	47.4
Streblospio benedicti	38.0	61.0	49.5	16.3
ARTHROPODA				
Ampelisca abdita	8.0	11.0	9.5	2.1
Corophium acherusicum	4.0	3.0	3.5	0.7
Corophium insidiosum	3.0	2.0	2.5	0.7
Corophium spp.	9.0	9.0	9.0	0.
Grandidierella japonica	30.0	18.0	24.0	8.5
MOLLUSCA				
Boonea sp.	0.	4.0	2.0	2.8
Gemma gemma	815.0	983.0	899.0	118.8
Macoma balthica	14.0	30.0	22.0	11.3
Mya arenaria	1.0	3.0	2.0	1.4
MISC.				
Nematoda	0.	1.0	0.5	0.7