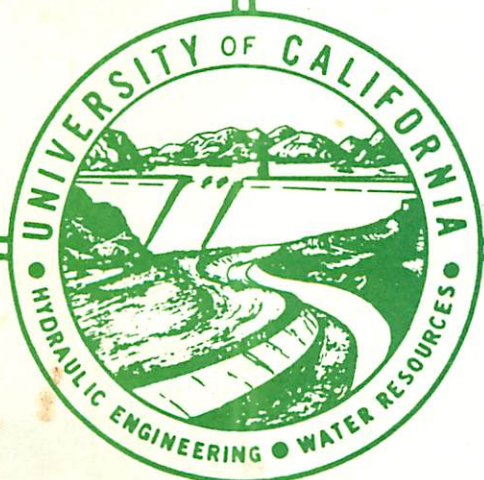


FAUNAL COMMUNITIES ON  
THE CENTRAL CALIFORNIA  
CONTINENTAL SHELF NEAR  
SAN FRANCISCO

A SEDIMENTARY ENVIRONMENTAL STUDY

by

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Berkeley, California  
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FOREWORD

The following report is an outgrowth of part of a study (Yancey, 1970) sponsored by the City and County of San Francisco through Brown and Caldwell, consulting engineers, to determine environmental conditions in the Gulf of the Farallones with respect to its suitability to act as receiving waters for a portion of San Francisco's effluent. The novel significance of this report is that the samples used were taken previously by the Hydraulic Engineering Research Laboratory, University of California, for research into sediment transport on Central California continental shelf for projects sponsored by the U. S. Army Corps of Engineers with no idea that eventually the samples could be used to obtain ecological background data. Thus, the samples were already available avoiding additional expensive shipping and collection costs.

With the increased public interest in the environment and the consequent addition of governmental requirements that the possible environmental impact be considered in the design of public works in the marine environment, more such studies will be required to ascertain pre-construction environmental conditions. Accordingly, it is hoped that this report may serve as a guide for future marine environmental studies economically utilizing existing marine sediment collections.

ABSTRACT

Correlation of identity and numbers of organic hard parts with bottom sedimentary environments from 50 sediment samples from the San Francisco offshore bar and adjacent areas in the Gulf of the Farallones of the Central California continental shelf permit the subdivision of this region into three faunal communities.

I. The hard substrate community, in areas of rocky bottoms shows the greatest faunal diversity, particularly in molluscs, and the highest percentage of organic hard parts.

II. The shelf community, in fine grained sediments found in water depths greater than 40 feet, is the most widespread characterized by relatively low productivity.

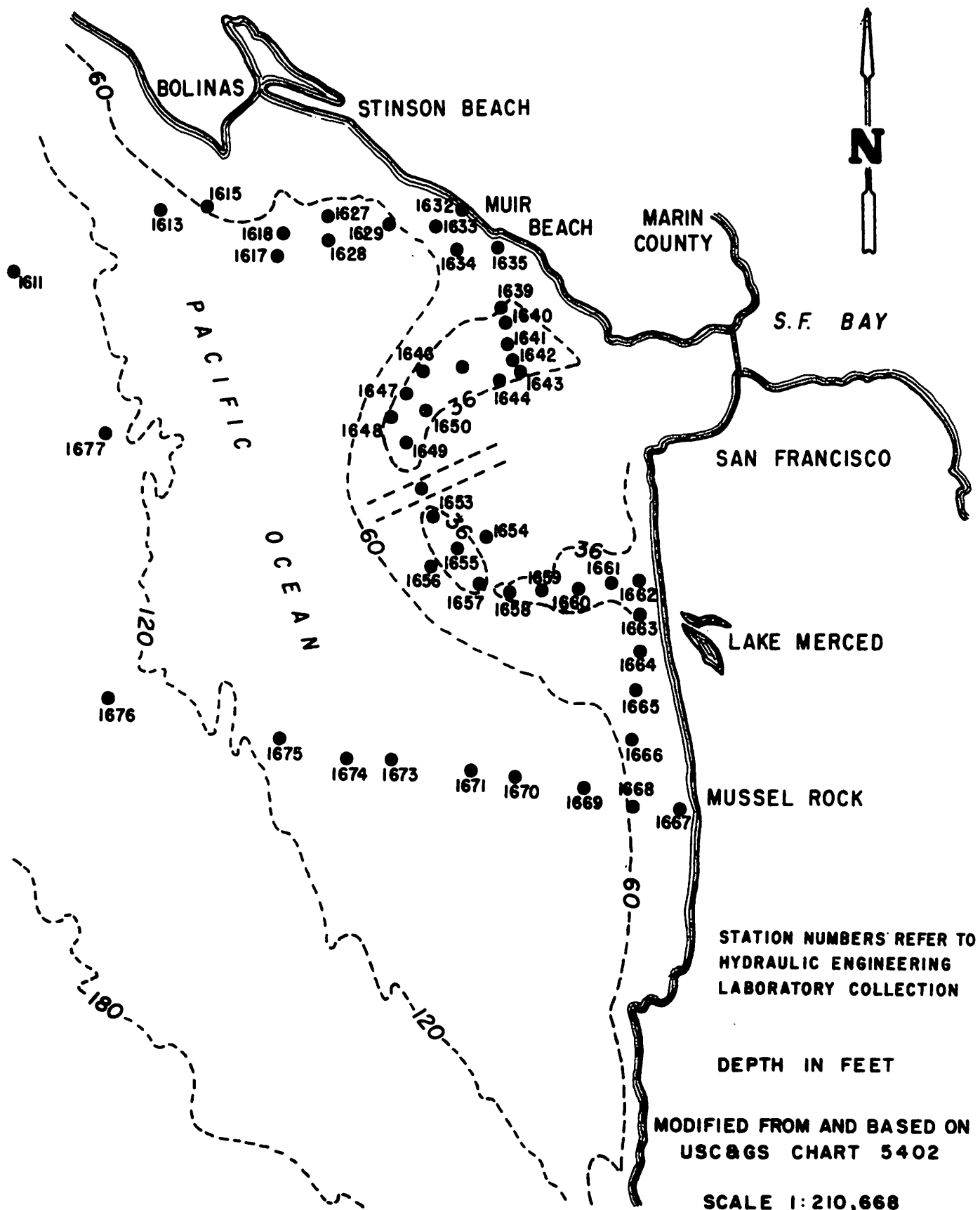
III. The bar community on relatively sandy bottoms on the San Francisco bar and near Mussel Rock shows variable productivity with a preponderance of echnoid parts and juveniles particularly of arthropods and molluscs.

## INTRODUCTION

This study is devoted to an analysis of the marine benthic fauna of the shallow continental shelf near the San Francisco area of central California. The conclusions of this study are based on an analysis of the organic hard parts of organisms that lived within the area of deposition of the sediments they occur with. Molluscs are the dominant producers of hard parts in this area, and echinoderms locally provide large amounts of hard parts, but overall about a dozen phyla are represented in the faunas.

The samples used for this faunal survey (Fig. 1) are part of a suite of samples collected in June 1964 (Moore, 1965) as part of a sampling program for a report on the sediments of the nearshore marine sediments in the vicinity of San Francisco and the Golden Gate. Moore's study covered the provenance and distribution of the marine sediments. In 1968 the area of Bolinas Bay was resampled, and a comprehensive series of reports issued on the composition, provenance and distribution of marine sediments in Bolinas Bay (Isselhardt and others, 1968, 1969, Wilde and others, 1969). These reports effectively summarized the state of knowledge on the bottom sediments for this area of the continental shelf.

Faunas on the open continental shelf have received a limited amount of study, although a considerable amount of work has been done on faunas of the adjacent San Francisco and Tomales Bays. The most important faunal references are Packard (1918) on San Francisco Bay, and Smith and Gordon (1948) and Light and others (1961) on adjacent areas. Also pertinent are Odemar and others (1968), Gustafson (1968) and Chan and Molina (1969). A reference is made in Coan (1968) to faunal



**FIG. 1      SAMPLE LOCATION**

community composition in Half Moon Bay, a short distance to the south of the study area.

#### SAMPLE COLLECTION AND PREPARATION

Sample collection consisted of towing a three-foot-long, six-inch-diameter pipe dredge a short distance (100-200 yards) obtaining a sample from the surface layer of sediment. Samples range generally between one and two quarts in volume. After collection the samples were dried in which state they were made available for this study.

Samples were screened into portions lesser and greater than  $\frac{1}{2}$  mm., and the organic material separated from the larger than  $\frac{1}{2}$  mm. fraction. The weight of this organic material was then determined. This technique recovered nearly all of the preserved organic matter in the samples, which are medium to coarse grained and contain most organic remains in the form of shell material. Measurements are made of sample weight and organic matter weight, with percentages of organic matter calculated for each sample.

For each sample the identifiable organic hard parts greater than  $\frac{1}{2}$  mm. were separated and tabulated. Numbers of individuals present in each sample are noted for each taxon in the samples. Identification of organic hard parts was made to the generic level, and specific level when possible. A few groups are too poorly known or inadequately preserved to permit identifications to this level.

Comparative collections of the Department of Paleontology of the University of California and of the Department of Geology of the California Academy of Sciences were consulted for identification of taxa in these samples.

## COMMUNITIES

Studies of southern California continental shelf faunas have produced a series of reports on the benthic faunal communities in these areas in the manner of community structures presented in Thorsen (1957). The most important of these reports are Jones (1964), Hartman (1955), and Hartman and Barnard (1960). In contrast, the only references to community analysis for the northern California faunal province is that of Coan (1968), and in unreduced data presented by Odemar and others (1968) for deep water localities.

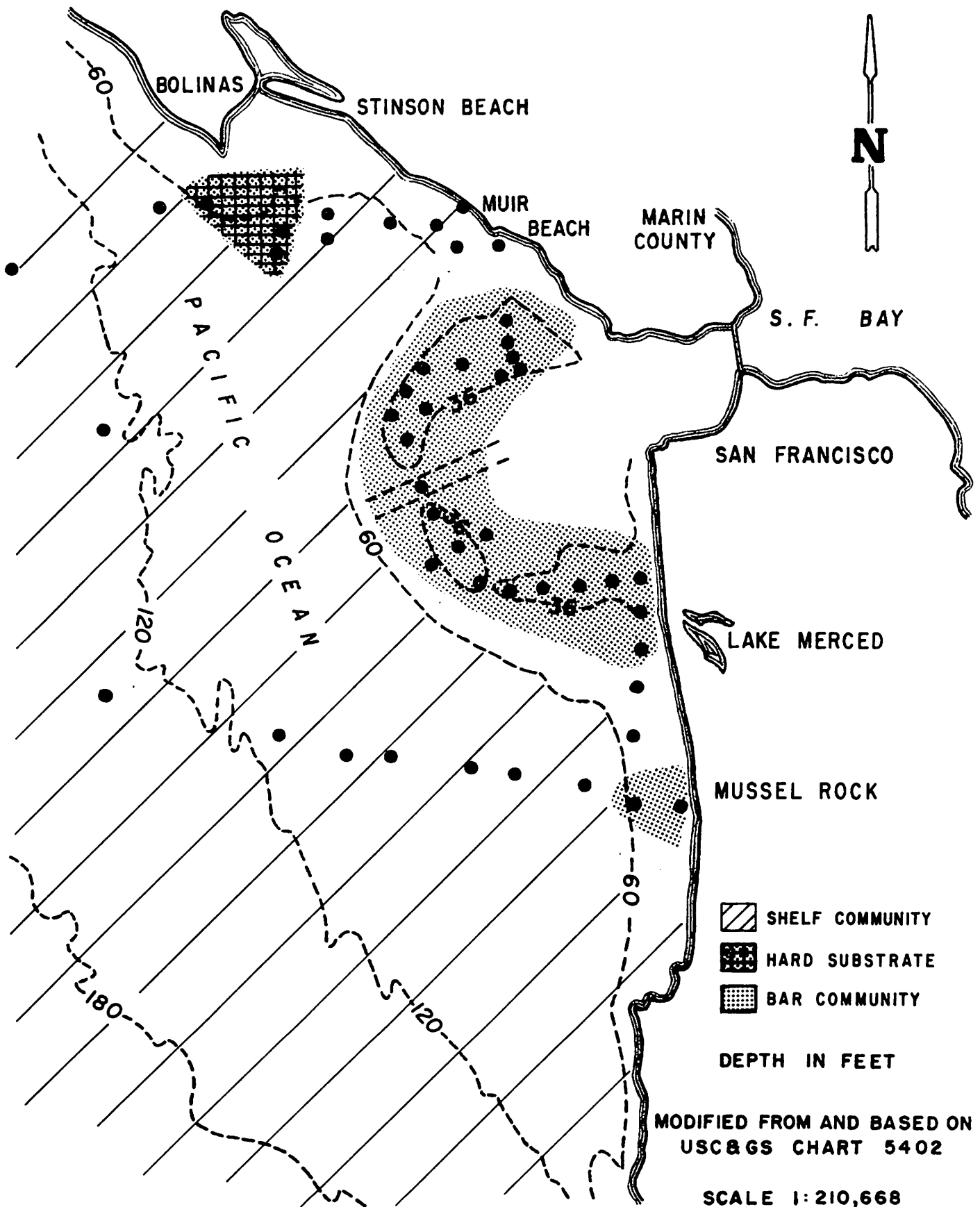
The benthic fauna includes three faunal groupings that differ in dominant taxa, productivity, and substrate they live in and have separate distributions. Their distributions are controlled principally by bottom sediment type and by degree of exposure to wave agitation. Their productivity is measured by the percentage of organic hard parts composing the sediments. The communities are the Hard Substrate community, the Bar community, and the Shelf community (Fig. 2).

### Community Composition and Environment

The Hard Substrate community occurs in sediments adjacent to rocky bottoms. Samples with this faunal content are from the vicinity of the submerged reefs due south of Bolinas and include samples 1615, 1617, and 1618. The Hard Substrate community extends northward from the sample area, along the reefy margins of the Point Reyes Peninsula. This community contains the greatest faunal diversity, especially in the molluscan fraction, and the greatest organic hard parts content.

The Shelf community is the most widespread community and inhabits finer grained sediments in water depths greater than 40 feet. It is





**FIG. 2 COMMUNITY DISTRIBUTION MAP**

present in samples 1611, 1613, 1627-1629, 1632-1635, 1665-1666, 1669-1677. Its most abundant components are foraminifera, especially Elphidiella hannai, arthropods, especially Pseudophilomedes, sp., and molluscs, characteristically the bivalves Nuculana taphria and Mysella tumida and the gastropod Mitrella gouldii. Bivalves are the dominant group. This community has low productivity of organic hard parts, consistently measuring less than one-half of one percent.

The Bar community is the one found on San Francisco Bar, and is characteristic of medium grained sediments subject to moderate to strong wave action, and occurs in depths of 50 feet or less. The great majority of samples containing this community are from San Francisco Bar, 1639-1664, with a couple of samples from the vicinity of Mussel Rock, 1667-1668. This community is characterized by an abundance of the echinoid Dendraster excentricus and by abundant small individuals of the barnacle Balanus sp., and by the bivalves Spisula cf. S. catilliformis and Tellina salmonea and the gastropod Olivella baetica. The occurrence of Dendraster excentricus reveals the adaptation of this community to conditions of high wave energy. In keeping with such variable physical conditions, this community has variable productivity, from a low of less than one-tenth of one percent to a high of about two percent. In most cases it is dominated by juveniles of arthropods and molluscs.

In nearly all the samples studied, the great majority of organisms are of small size. Normally some of the taxa in each sample occur in great abundance, although with their small size they do not produce a high percentage of organic hard parts in the sample. The Bar community is dominated by juvenile individuals of taxa that become much larger

at maturity. This is true of most of the bivalves in the community, especially with the genera Modiolus, Siliqua, Spisula, and Tellina. The barnacle Balanus is also abundantly represented by juveniles.

#### Productivity

Productivity is determined here as the measure of percentage of organic hard parts in the sample (Fig. 3). The Hard Substrate community shows the highest productivity, with organic hard parts comprising up to a few percent of the sediment. The widespread Shelf community normally produces organic hard parts in a quantity of less than one-half of one percent of the sample. The true organic content is probably significantly greater than this, with many soft bodied organisms living in the fine-grained substrate containing this community.

Productivity of the Bar community is variable. In many cases it is very low, comprising less than one-tenth of one percent of the sample, while in others it reaches one or two percent. This variation is due mostly to the abundance of echinoids in the sample. The presence of abundant echinoids provides a degree of protection for the substrate that produces favorable conditions for the other elements of the community.

#### Distribution Maps

A distribution map is shown for the faunal communities and shows the limits of the communities. A map (Fig. 4) showing the abundance of the echinoid Dendraster excentricus is presented to show the extent of bottom conditions favorable to the development of the Bar community. Due to the economic importance of the crab Cancer, a map (Fig. 5) showing the abundance of Cancer sp. is presented. Most of the individuals of this genus present in the sample are juveniles.

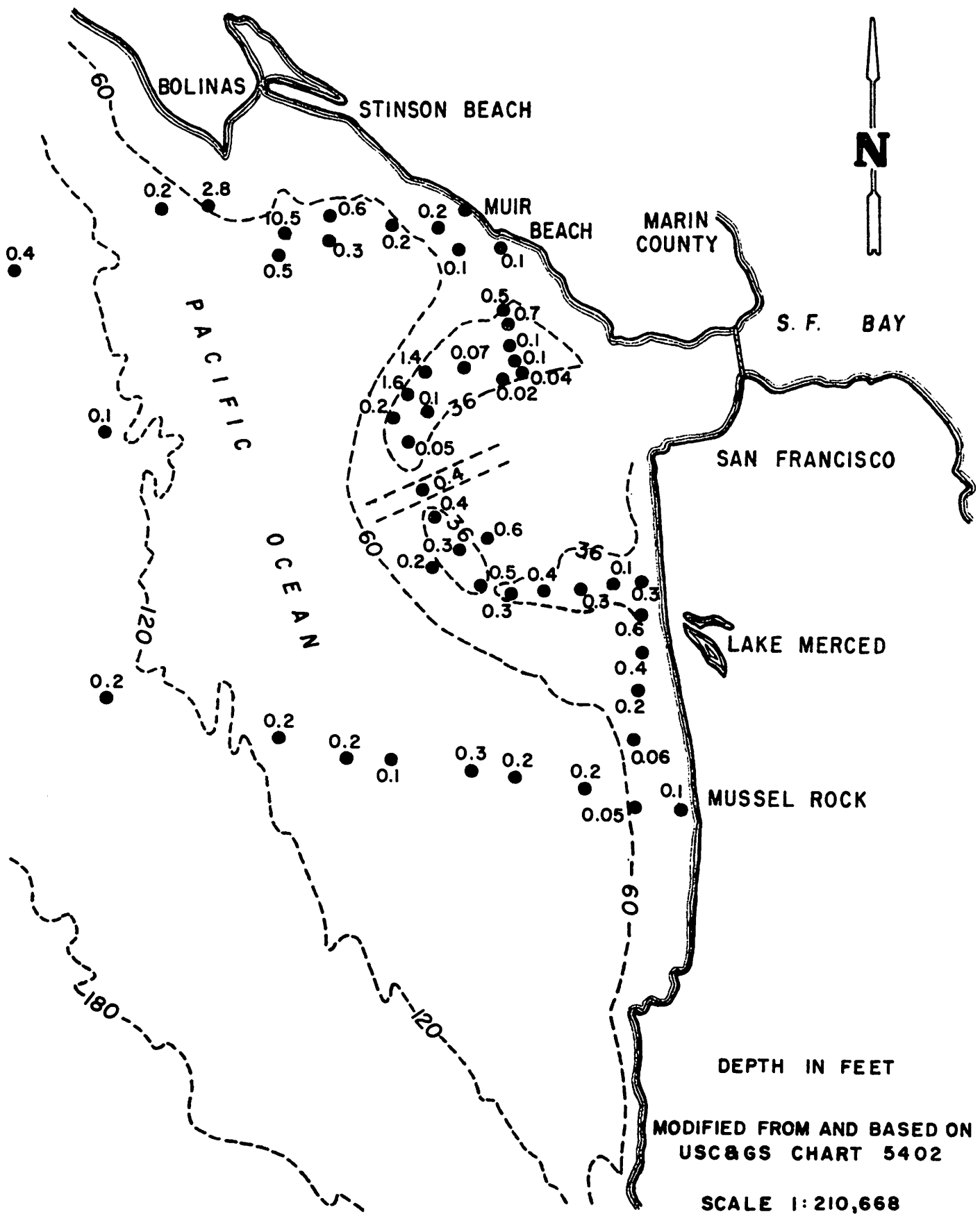


FIG. 3 WEIGHT PERCENT ORGANIC HARD PARTS

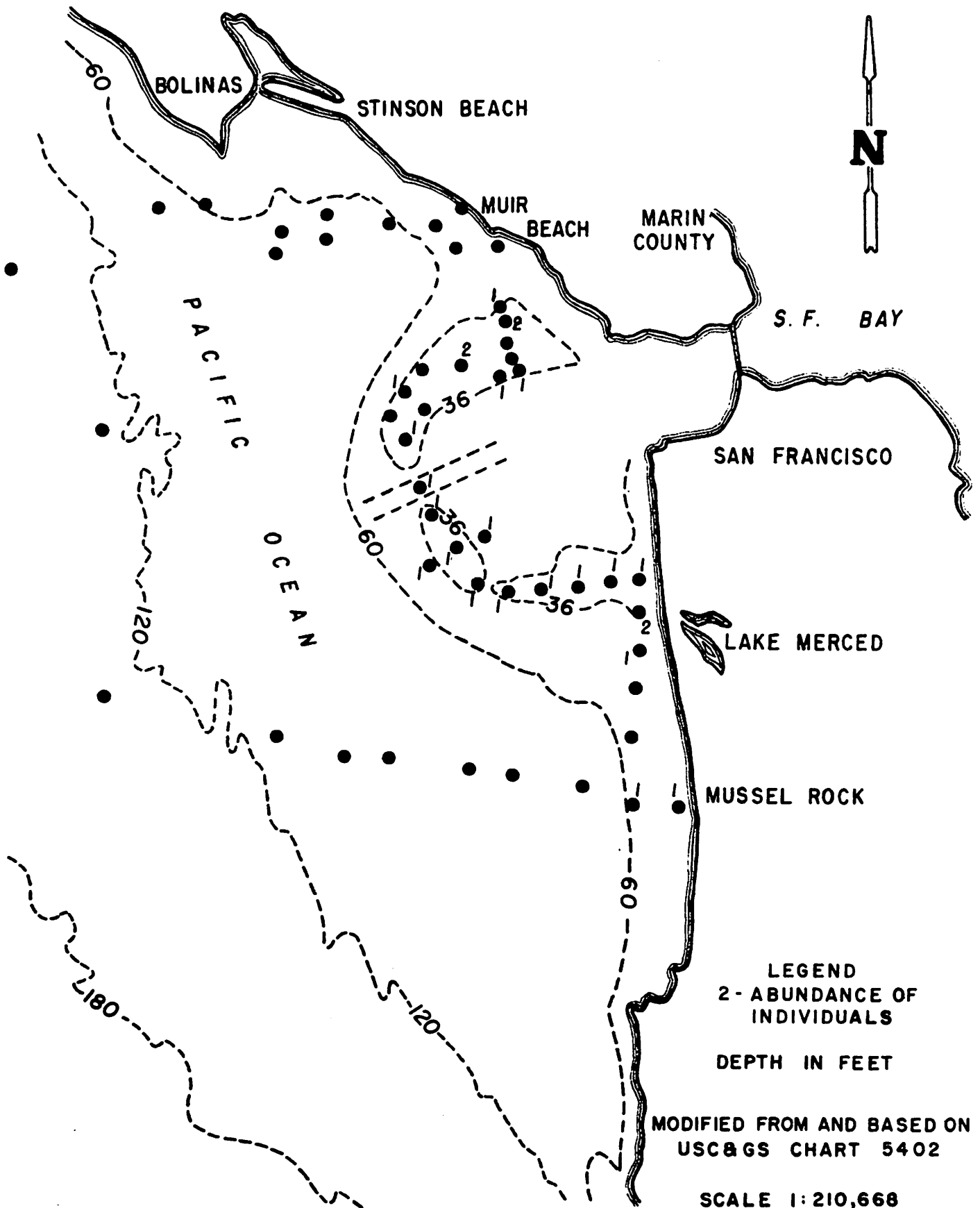
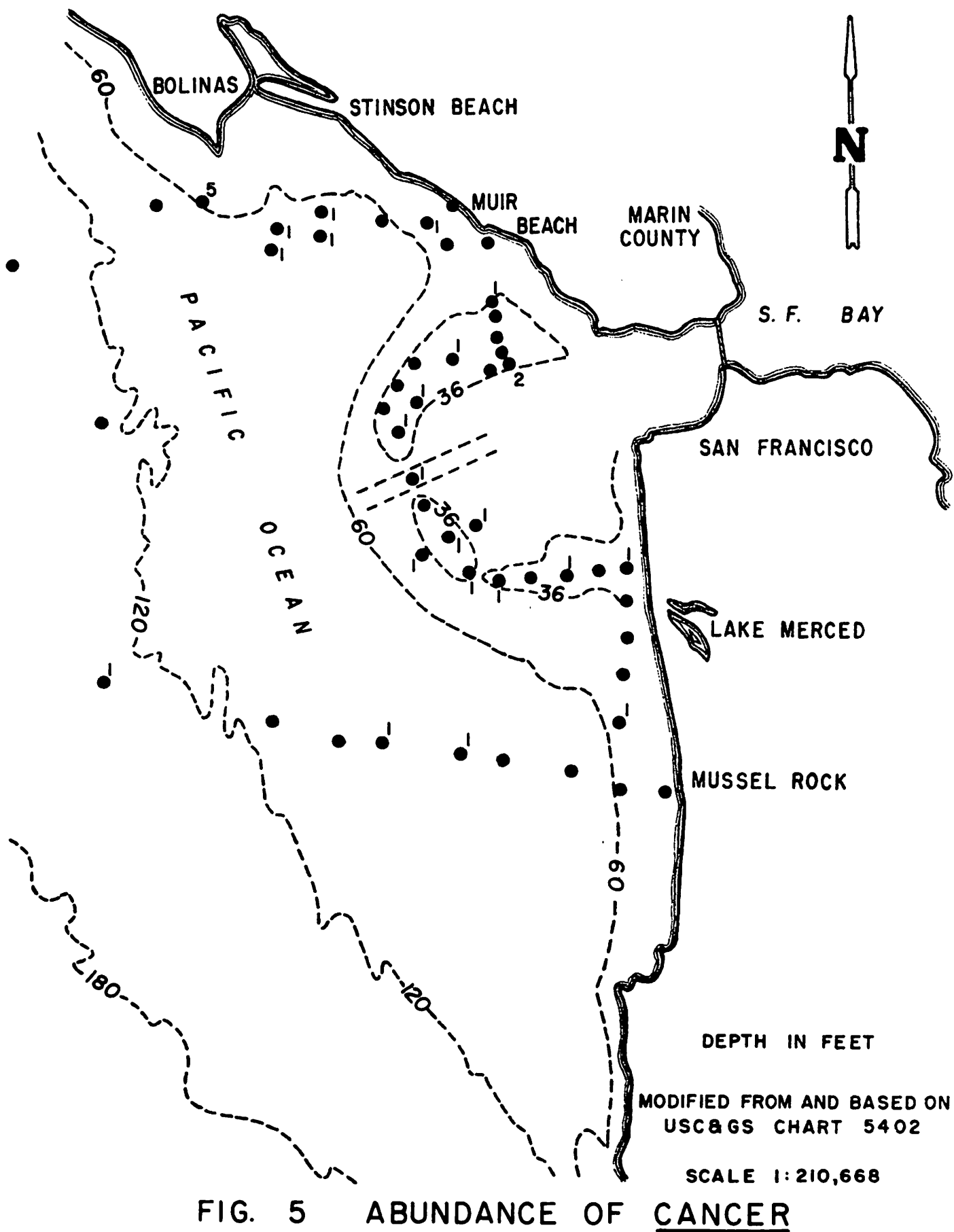


FIG. 4 ABUNDANCE OF DENDRASTER EXCENTRICUS



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## FAUNAL LISTS AND SAMPLE WEIGHTS

Sample 1611

Total sample weight: 268 grams

Percentage of organic hard parts in sample: 0.4%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai

- 2 individuals

Nonionella sp.

- 1 "

Phylum ARTHROPODA

Class Crustacea

ostracods

Pseudophilomedes sp.

- 12 individuals

Phylum MOLLUSCA

Class Bivalvia

Nuculana sp. juv.

- 1 individuals

Mysella tumida

- 24 "

Class Gastropoda

Nassarius sp.

- 1 individuals

"WORMS"

chitinous worm tubes

- few

Sample 1613

Total sample weight: 497 grams

Percentage of organic hard parts in sample: 0.2%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 40 individuals
<u>Nonionella</u> sp.	- 2 "

Phylum ARTHROPODA

Class Crustacea

ostracods

<u>Pseudophilomedes</u> sp.	- 1 individuals
<u>Rutiderma</u> sp.	- 1 "

Phylum MOLLUSCA

Class Bivalvia

<u>Nuculana taphria</u>	- 1 individuals
<u>Siliqua</u> sp.	- 1 "
<u>Tellina carpenteri</u>	- 7 "
<u>Macoma yoldiformis</u>	- 1 "
<u>Spisula</u> cf. <u>S. catilliformis</u>	- 1 "
<u>Mysella tumida</u>	- 7 "
<u>Macoma</u> sp.	- 1 "

Class Scaphopoda

<u>Cadulus fusiformis</u>	- 1 individuals
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Class Gastropoda

<u>Mitrella gouldii</u>	- 6 individuals
<u>Odostomia</u> sp. juv.	- 1 "
<u>Turbonilla</u> sp.	- 2 "

"WORMS"

chitinous worm tubes	- abundant
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Phylum VERTEBRATA

vertebrae	- one specimen
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Sample 1615

Total sample weight: 233 grams

Percentage of organic hard parts in sample: 2.8%

Phylum PROTISTA

Order Foraminifera

<u>Haplophragmoides</u> sp.	- 60 individuals
<u>Elphidiella hannai</u>	- 60 "
<u>Massilina</u> sp.	- 6 "
<u>Poroeponides</u> sp.	- 4 "
<u>Triloculina</u> sp.	- 8 "
<u>Rotorbinella</u> sp.	- 2 "

Phylum BRYOZOA (Entoprocta and Ectoprocta)

several genera

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 9 individuals

crabs

Cancer sp. - 5 "

Phylum BRACHIOPODA

Terebratulina unguicula - 2 individuals

Phylum MOLLUSCA

Class Amphineura

Mopalia sp. - 1 individuals

Class Bivalvia

Nuculana taphria - 7 individuals

Chlamys hastatus - 1 "

Hinnites multirugosus - 2 "

Modiolus sp. juv. - 4 "

Transennella tantilla - 4 "

## Sample 1615 cont.

<u>Kellis</u> sp. ?	- 1 individuals	
<u>Glans</u> <u>carpenteri</u>	- 1	"
<u>Protothaca</u> <u>staminea</u>	- 6	" , mostly juveniles
<u>Clinocardium</u> <u>fucanum</u>	- 1	"
<u>Mya</u> cf. <u>M. truncata</u>	- 6	"
<u>Spisula</u> cf. <u>S. catilliformis</u>	- 2	"
<u>Mysella</u> <u>tumida</u>	- 26	"
<u>Macoma</u> <u>secta</u>	- 3	"
<u>Macoma</u> <u>inconspicua</u>	- 1	"
<u>Nettastomella</u> <u>rostrata</u>	- 8	"

## Class Gastropoda

<u>Crepidula</u> sp. juv.	- 3 individuals	
<u>Nassarius</u> <u>mendicus</u>	- 15	"
<u>Ocenebra</u> sp. juv.	- 1	"
<u>Bittium</u> <u>eschrictii</u>	- 1	"
<u>Amphissa</u> sp.	- 1	"
<u>Turbonilla</u> sp.	- 2	"
<u>Odostomia</u> sp. juv.	- 6	"
<u>Alvania</u> <u>acutilirata</u>	- 4	"
<u>Cypraeolina</u> <u>pyriformis</u>	- 1	"

## "WORMS"

calcareous worm tubes	- 2 individuals
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Sample 1617

Total sample weight: 1258 grams

Percentage of organic hard parts in sample: 0.5%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 17 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

three genera

Phylum ARTHROPODA

Class Crustacea

ostracods

Pseudophilomedes sp. - 1 individuals

barnacles

Balanus sp. - 5 "

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Nuculana taphria - 2 individuals

Hinnites multirugosus - 4 "

Ostrea lurida - 1 "

Protothaca staminea - 9 "

Clinocardium nuttallii - 2 "

Clinocardium fucanum - 3 "

Transennella tantilla - 45 "

Mysella tumida - 3 "

Mya cf. M. truncata - 3 "

Macoma secta - 1 "

Class Scaphopoda

Cadulus fusiformis - 1 individuals

Sample 1617 cont.

Class Gastropoda

<u>Crepidatella</u> sp. juv.	- 2 individuals
<u>Margarites</u> sp. ?	- 4 "
<u>Homalopoma</u> sp. ?	- 1 "
<u>Nassarius mendicus</u>	- 12 "
<u>Ocenebra</u> sp.	- 1 "
<u>Alvania acutilirata</u>	- 12 "
<u>Mitrella</u> sp.	- 1 "
<u>Epitonium</u> sp.	- 1 "
<u>Balcis</u> sp.	- 1 "
<u>Turbonilla</u> sp.	- 3 "

Sample 1618

Total sample weight: 1214 grams

Percentage of organic hard parts in sample: 10.5%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 85 individuals
<u>Massilina</u> sp.	- 1 "

Phylum ARTHROPODA

Class Crustacea

ostracods	
<u>Mutilus (Aurila)</u> sp.	- 1 individuals
barnacles	
<u>Balanus</u> sp.	- 2 individuals
crabs	
<u>Cancer</u> sp.	- 1 "

Phylum MOLLUSCA

Class Bivalvia

<u>Chlamys</u> sp.	- 1 individuals
<u>Protothaca staminea</u>	- 2 "
<u>Clinocardium nuttallii</u>	- 2 "
<u>Kellia laperousii</u>	- 1 "
<u>Transennella tantilla</u>	- 4 "
<u>Mysella tumida</u>	- 2 "
<u>Mya</u> cf. <u>M. truncata</u>	- 1 "
<u>Tellina bodegensis</u>	- 1 "

Class Gastropoda

<u>Polytropa lamellosa</u>	- 3 individuals
<u>Olivella baetica</u>	- 3 "
<u>Nassarius mendicus</u>	- 6 "
<u>Nassarius</u> cf. <u>N. perpinguis</u>	- 1 "
<u>Alvania acutilirata</u>	- 5 "
<u>Epitonium</u> sp.	- 1 "
<u>Odostomia</u> sp.	- 1 "
<u>Turbonilla</u> sp.	- 1 "
<u>Mangelia barbarensis</u>	- 1 "
<u>Acteon</u> ? sp.	- 1 "

Sample 1618 cont.

Phylum VERTEBRATA

vertebrae  
fish dermal plate

- one specimen  
- one specimen



Sample 1627

Total sample weight: 245 grams

Percentage of organic hard parts in sample: 0.6%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 7 individuals

Phylum ARHTROPODA

Class Crustacea

ostracods

Pseudophilomedes sp. - 2 individuals

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Mysella tumida - 12 individuals

Axinopsida sericata - 1 "

Class Gastropoda

Mitrella sp. - 1 individuals

"WORMS"

Chitinous worm tubes - few

Miscellaneous plant fragments

Sample 1628

Total sample weight: 487 grams

Percentage of organic hard parts in sample: 0.3%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 50 individuals

Phylum ARTHROPODA

Class Crustacea

ostracods

Pseudophilomedes - 5 individuals

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Mysella tumida - 55 individuals

Axinopsida sericata - 1 "

Tellina carpenteri - 6 "

Class Gastropoda

Mitrella gouldii - 4 individuals

Nassarius perpinguis - 1 "

Turbonilla sp. - 2 "

"WORMS"

chitinous worm tubes - abundant

agglutinated worm tubes - few

Sample 1629

Total sample weight: 1152 grams

Percentage of organic hard parts in sample: 0.2%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 95 individuals
<u>Massilina</u> sp.	- 2 "

Phylum ARTHROPODA

Class Crustacea

ostracods

<u>Pseudophilomedes</u> sp.	- 7 individuals
<u>Rutiderma</u> sp.	- 1 "

barnacles

<u>Balanus</u> sp.	- 1 "
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Phylum MOLLUSCA

Class Bivalvia

<u>Nuculana taphria</u>	- 6 individuals
<u>Protothaca tenerrima</u>	- 1 "
<u>Spisula</u> cf. <u>S. catilliformis</u>	- 1 "
<u>Mysella tumida</u>	- 24 "
<u>Axinopsida sericata</u>	- 4 "
<u>Tellina bodegensis</u>	- 10 "

Class Scaphopoda

<u>Cadulus fusiformis</u>	- 2 individuals
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Class Gastropoda

<u>Nassarius mendicus</u>	- 2 individuals
<u>Mitrella gouldii</u>	- 1 "
<u>Odostomia</u> sp.	- 1 "
<u>Mangelia barbarensis</u>	- 1 "
<u>Acteon punctocoelata</u>	- 1 "

"WORMS"

chitinous worm tubes	- abundant
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Sample 1633

Total sample weight: 826 grams

Percentage of organic hard parts in sample: 0.2%

Phylum PROTISTA  
Order Foraminifera

Elphidiella hannai - 30 individuals

Phylum ARTHROPODA  
Class Crustacea

ostracods

Pseudophilomedes sp. - 7 individuals

barnacles

Balanus sp. - 1 "

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA  
Class Bivalvia

Modiolus sp. juv. - 1 individuals

Siliqua sp. - 1 "

Mysella tumida - 6 "

Axinopsida sericata - 1 "

Tellina bodegensis - 11 "

Class Gastropoda

Mitrella gouldii - 3 individuals

Cypraeolina sp. - 1 "

"WORMS"

chitinous worm tubes - abundant

Sample 1634

Total sample weight: 795 grams

Percentage of organic hard parts in sample: 0.1%

Phylum BRYOZOA (Entoprocta and Ectoprocta)

one genus

Phylum ARTHROPODA

Class Crustacea

ostracods

Pseudophilomedes sp. - 3 individuals

Phylum MOLLUSCA

Class Bivalvia

Nuculana taphria - 2 individuals

Spisula cf. S. catilliformis - 2 "

Mysella tumida - 3 "

Mysella sp. - 1 "

Tellina bodegensis - 5 "

"WORMS"

worm jaws - 1 specimen

chitinous worm tubes - abundant

agglutinated worm tubes - few

Sample 1635

Total sample weight: 1157 grams

Percentage of organic hard parts in sample: 0.1%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 8 individuals
<u>Massilina</u> sp.	- 3 "

Phylum ARTHROPODA

Class Crustacea

ostracods	
<u>Pseudophilomedes</u> sp.	- 3 individuals

Phylum MOLLUSCA

Class Bivalvia

<u>Nuculana</u> sp. juv.	- 1 individuals
<u>Modiolus</u> sp. juv.	- 1 "
<u>Spisula</u> cf. <u>S. catilliformis</u>	- 4 "
<u>Mysella tumida</u>	- 6 "
<u>Macoma</u> sp.	- 1 "
<u>Tellina bodegensis</u>	- 7 "

"WORMS"

chitinous worm tubes	- few
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Phylum VERTEBRATA

vertebrae	- 2 individuals
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Sample 1639

Total sample weight: 627 grams

Percentage of organic hard parts in sample: 0.5%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 7 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

two genera

Phylum ARTHROPODA

Class Crustacea

ostracods

Pseudophilomedes sp. - 1 individuals

Mutilus (Aurila) sp. - 1 "

barnacles

Balanus sp. - 1 "

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Amphineura

Mopalia sp. - 1 individuals

Class Bivalvia

Nuculana sp. - 1 individuals

Clinocardium nuttallii - 1 "

Transennella tantilla - 3 "

Spisula cf. S. catilliformis - 9 "

Mysella tumida - 10 "

Mysella sp. - 1 "

Tellina salmonea - 3 "

Tellina bodegensis - 11 "

Class Gastropoda

Olivella sp. - 2 individuals

Mitrella sp. - 1 "

Sample 1639 cont.

Phylum ECHINODERMATA  
Class Echinoidea

Dendraster excentricus

- 1 individuals



Sample 1640

Total sample weight: 973 grams

Percentage of organic hard parts in sample: 0.7%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 4 individuals
<u>Tricohyalus</u> sp.	- 10 "

Phylum BRYOZOA (Entoprocta and Ectoprocta)

three genera

Phylum ARTHROPODA

Class Crustacea

barnacles

<u>Balanus</u> sp.	- 6 individuals
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Phylum MOLLUSCA

Class Bivalvia

<u>Modiolus</u> sp. juv.	- 3 individuals
<u>Hinnites multirugosus</u>	- 1 "
<u>Siliqua</u> sp.	- 1 "
<u>Clinocardium nuttallii</u>	- 1 "
<u>Transennella tantilla</u>	- 2 "
<u>Mysella tumida</u>	- 3 "
<u>Mysella</u> sp.	- 1 "
<u>Tellina salmonea</u>	- 9 "
<u>Tellina bodegensis</u>	- 2 "

Class Gastropoda

<u>Homalopoma</u> sp.	- 1 individuals
<u>Olivella baetica</u>	- 5 "

Phylum ECHINODERMATA

Class Echinoidea

<u>Dendraster excentricus</u>	- 1 individuals
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Phylum VERTEBRATA

skate tooth	- one specimen
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Sample 1641

Total sample weight: 1803 grams

Percentage of organic hard parts in sample: 0.1%

Phylum PROTISTA  
Order Foraminifera

Elphidiella hannai - 2 individuals

Phylum ARTHROPODA  
Class Crustacea

barnacles  
Balanus sp. - 5 individuals

Phylum MOLLUSCA  
Class Bivalvia

Nuculana taphria - 1 individuals

Protothaca sp. - 1 "

Spisula cf. S. catilliformis - 4 "

Transennella tantilla - 1 "

Macoma sp. - 2 "

Tellina salmonea - 4 "

Phylum ECHINODERMATA  
Class Echinoidea

Dendraster excentricus - 2 individuals

Sample 1642

Total sample weight: 1570 grams

Percentage of organic hard parts in sample: 0.1%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 2 individuals
<u>Tricohyalus</u> sp.	- 2 "

Phylum ARTHROPODA

Class Crustacea

barnacles	
<u>Balanus</u> sp.	- 4 individuals

Phylum MOLLUSCA

Class Bivalvia

<u>Modiolus</u> sp. juv.	- 2 individuals
<u>Protothaca</u> staminea	- 1 "
<u>Transennella</u> tantilla	- 2 "
<u>Mysella</u> tumida	- 1 "
<u>Tellina</u> salmonea	- 1 "
<u>Macoma</u> sp.	- 1 "

Class Gastropoda

<u>Crepidula</u> sp. juv.	- 1 individuals
<u>Olivella</u> bactica	- 1 "

Sample 1643

Total sample weight: 2164 grams

Percentage of organic hard parts in sample: 0.04%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 1 individuals
<u>Tricohyalus</u> sp.	- 1 "

Phylum ARTHROPODA

Class Crustacea

barnacles	
<u>Balanus</u> sp.	- 3 individuals
crabs	
<u>Cancer</u> sp.	- 2 "

Phylum MOLLUSCA

Class Bivalvia

<u>Spisula</u> cf. <u>S. catilliformis</u>	- 3 individuals
<u>Siliqua</u> sp.	- 1 "
<u>Axinopsida sericata</u>	- 1 "
<u>Tellina salmonea</u>	- 5 "

Class Gastropoda

<u>Nassarius</u> sp.	- 1 individuals
<u>Mitrella gouldii</u>	- 2 "

Phylum ECHINODERMATA

Class Echinoidea

<u>Dendraster excentricus</u>	- 1 individuals
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Sample 1644

Total sample weight: 850 grams

Percentage of organic hard parts in sample: 0.02%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 1 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

one genus

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 2 individuals

Phylum MOLLUSCA

Class Bivalvia

Transennella tantilla - 1 individuals

Spisula cf. S. catilliformis - 1 "

Mysella tumida - 1 "

Tellina salmonea - 1 "

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals

"WORMS"

worm jaw - one specimen

Phylum VERTEBRATA

vertebrae - one specimen

Sample 1645

Total sample weight: 1545 grams

Percentage of organic hard parts in sample: 0.07%

Phylum B RYOZOA (Entoprocta and Ectoprocta)

one genus

Phylum ARTHROPODA

Class Crustacea

ostracods		
<u>Pseudophilomedes</u> sp.	- 1	individuals
barnacles		
<u>Balanus</u> sp.	- 3	"
crabs		
<u>Cancer</u> sp.	- 1	"

Phylum MOLLUSCA

Class Bivalvia

<u>Nuculana taphria</u>	- 3	individuals
<u>Modiolus</u> sp. juv.	- 3	"
<u>Chlamys</u> sp. juv.	- 1	"
<u>Spisula</u> cf. <u>S. catilliformis</u>	- 3	"
<u>Transennella tantilla</u>	- 1	"
<u>Mysella tumida</u>	- 3	"
<u>Mya</u> sp.	- 1	"
<u>Macoma</u> sp.	- 2	"
<u>Tellina salmonea</u>	- 5	"
<u>Tellina bodegensis</u>	- 9	"

Class Gastropoda

<u>Olivella baetica</u>	- 3	individuals
<u>Epitonium</u> sp.	- 1	"

Phylum ECHINODERMATA

Class Echinoidea

<u>Dendraster excentricus</u>	- 2	individuals
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Sample 1646

Total sample weight: 228 grams

Percentage of organic hard parts in sample: 1.4%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 70 individuals

Phylum ARTHROPODA

Class Crustacea

ostracods

Pseudophilomedes sp. - 1 individuals

Phylum MOLLUSCA

Class Bivalvia

Nuculana sp. - 1 individuals

Mysella tumida - 10 "

Tellina bodegensis - 4 "

"WORMS"

chitinous worm tubes - few

Sample 1647

Total sample weight: 288 grams

Percentage of organic hard parts in sample: 1.6%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 60 individuals

Phylum ARTHROPODA

Class Crustacea

ostracods

Pseudophilomedes sp. - 3 individuals

barnacles

Balanus sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Nuculana taphria juv. - 2 individuals

Mysella tumida - 27 "

Tellina bodegensis - 12 "

Class Gastropoda

Nassarius sp. - 1 individuals

Acteocina sp. juv. - 1 "

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals

"WORMS"

chitinous worm tubes - abundant



Sample 1648

Total sample weight: 842 grams

Percentage of organic hard parts in sample: 0.2%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 2 individuals

Phylum ARTHROPODA

Class Crustacea

ostracods

Pseudophilomedes sp. - 1 individuals

barnacles

Balanus sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Nuculana taphria - 1 individuals

Protothaca staminea - 1 "

Siliqua sp. - 1 "

Mysella tumida - 6 "

Tellina bodegensis - 4 "

Class Scaphopoda

Cadulus fusiformis - 1 individuals

"WORMS"

chitinous worm tubes - few

Phylum VERTEBRATA

vertebrae - one specimen

Sample 1649

Total sample weight: 2137 grams

Percentage of organic hard parts in sample: 0.05%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 2 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

one genus

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 2 individuals

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Modiolus sp. juv. - 2 individuals

Siliqua sp. - 1 "

Spisula cf. S. catilliformis - 7 "

Mysella sp. - 1 "

Tellina salmonea - 6 "

Tellina bodegensis - 1 "

Class Gastropoda

Olivella baetica - 1 individuals

Odostomia sp. - 1 "

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals

Sample 1650

Total sample weight: 2306 grams

Percentage of organic hard parts in sample: 0.1%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 1 individuals
<u>Tricohyalus</u> sp.	- 1 "

Phylum BRYOZOA (Entoprocta and Ectoprocta)

four genera

Phylum ARTHROPODA

Class Crustacea

barnacles	
<u>Balanus</u> sp.	- 3 individuals
crabs	
<u>Cancer</u> sp.	- 1 "

Phylum MOLLUSCA

Class Bivalvia

<u>Modiolus</u> sp. juv.	- 2 individuals
<u>Spisula</u> cf. <u>S. catilliformis</u>	- 4 "
<u>Siliqua</u> sp.	- 1 "
<u>Clinocardium nuttallii</u>	- 1 "
<u>Mysella tumida</u>	- 1 "
<u>Macoma</u> sp.	- 2 "
<u>Tellina bodegensis</u>	- 2 "

Class Gastropoda

<u>Crepidula</u> sp. juv.	- 3 individuals
<u>Olivella baetica</u>	- 3 "
<u>Micranellum</u> ? sp.	- 1 "

"WORMS"

chitinous worm tubes	- few
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## Sample 1652

Total sample weight: 1561 grams

Percentage of organic hard parts in sample: 0.4%

## Phylum PROTISTA

## Order Foraminifera

<u>Elphidiella hannai</u>	- 2 individuals
<u>Tricohyalus</u> sp.	- 1 "

## Phylum BRYOZOA (Entoprocta and Ectoprocta)

three genera

## Phylum ARTHROPODA

## Class Crustacea

barnacles

<u>Balanus</u> sp.	- 40 individuals
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crabs

<u>Cancer</u> sp.	- 1 "
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## Phylum MOLLUSCA

## Class Bivalvia

<u>Modiolus</u> sp. juv.	- 1 individuals
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<u>Siliqua patula</u>	- 1 "
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<u>Spisula</u> cf. <u>S. catilliformis</u>	- 6 "
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<u>Transennella tantilla</u>	- 2 "
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<u>Macoma</u> sp.	- 1 "
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<u>Tellina salmonea</u>	- 27 "
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<u>Tellina bodegensis</u>	- 3 "
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## Class Gastropoda

<u>Olivella baetica</u>	- 2 individuals
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## Phylum ECHINODERMATA

## Class Echinoidea

<u>Dendraster excentricus</u>	- 1 individuals
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## Phylum VERTEBRATA

vertebrae	- one specimen
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Sample 1653

Total sample weight: 965 grams

Percentage of organic hard parts in sample: 0.4%

Phylum PROTISTA  
Order Foraminifera

Elphidiella hannai - 1 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

two genera

Phylum ARTHROPODA  
Class Crustacea

barnacles  
Balanus sp. - 1 individuals

Phylum MOLLUSCA  
Class Bivalvia

Modiolus sp. juv. - 3 individuals

Chlamys sp. - 1 "

Spisula cf. S. catilliformis - 1 "

Siliqua sp. - 1 "

Tellina salmonea - 3 "

Tellina bodegensis - 1 "

Class Gastropoda

Olivella sp. - 1 individuals

Phylum ECHINODERMATA  
Class Echinoidea

Dendraster excentricus - 1 individuals

Sample 1654

Total sample weight: 831 grams

Percentage of organic hard parts in sample: 0.6%

Phylum BRYOZOA (Entoprocta and Ectoprocta)

one genus

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 3 individuals

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Nuculana sp. - 1 individuals

Clinocardium nuttallii - 1 "

Siliqua sp. - 1 "

Spisula cf. S. catilliformis - 1 "

Tellina salmonea - 2 "

Tellina bodegensis - 1 "

Class Gastropoda

Crepidula sp. juv. - 1 individuals

Nassarius perpinguis - 2 "

Olivella sp. - 3 "

Micranellum ? sp. - 1 "

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals

Sample 1655

Total sample weight: 1681 grams

Percentage of organic hard parts in sample: 0.2%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 1 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

two genera

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 1 individuals

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Ostrea lurida - 1 individuals

Clinocardium nuttallii - 1 "

Spisula cf. S. catilliformis - 4 "

Siliqua sp. - 1 "

Kellia laperousii - 1 "

Mysella tumida - 2 "

Tellina salmonea - 3 "

Class Gastropoda

Olivella baetica - 8 individuals

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals

"WORMS"

chitinous worm tubes - few

Sample 1656

Total sample weight: 1270 grams

Percentage of organic hard parts in sample: 0.2%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 1 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

two genera

Phylum ARTHROPODA

Class Crustacea

ostracods

Pseudophilomedes sp. - 1 individuals

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Modiolus sp. juv. - 3 individuals

Clinocardium nuttallii - 1 "

Spisula cf. S. catilliformis - 4 "

Macoma sp. - 1 "

Tellina salmonea - 3 "

Tellina bodegensis - 2 "

Class Gastropoda

Nassarius perpinguis - 1 individuals

Olivella baetica - 4 "

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals



Sample 1657

Total sample weight: 220 grams

Percentage of organic hard parts in sample: 0.5%

Phylum BRYOZOA (Entoprocta and Ectoprocta)

one genus

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 1 individuals

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Macoma sp. - 1 individuals

Tellina salmonea - 2 "

Class Gastropoda

Olivella baetica - 1 individuals

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals

Sample 1658

Total sample weight: 1329 grams

Percentage of organic hard parts in sample: 0.3%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 2 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

two genera

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 3 individuals

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Modiolus sp. juv. - 1 individuals

Siliqua sp. - 1 "

Spisula cf. S. catilliformis - 4 "

Transennella tantilla - 1 "

Tellina salmonea - 9 "

Tellina bodegensis - 2 "

Class Gastropoda

Nassarius sp. - 1 individuals

Olivella baetica - 3 "

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals

Sample 1659

Total sample weight: 1363 grams

Percentage of organic hard parts in sample: 0.04%

Phylum PROTISTA

Order Foraminifera

Tricohyalus sp. - 1 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

two genera

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 1 individuals

Phylum MOLLUSCA

Class Bivalvia

Modiolus sp. juv. - 1 individuals

Clinocardium nuttallii - 1 "

Spisula cf. S. catilliformis - 2 "

Tellina salmonea - 5 "

Class Gastropoda

Olivella sp. - 1 individuals

Mitrella sp. - 1 "

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals

"WORMS"

chitinous worm tubes - few

Sample 1660

Total sample weight: 845 grams

Percentage of organic hard parts in sample: 0.3%

Phylum BRYOZOA (Entoprocta and Ectoprocta)

one genus

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 1 individuals

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Modiolus sp. juv. - 1 individuals

Chlamys sp. juv. - 1 "

Tellina salmonea - 8 "

Class Gastropoda

Olivella baetica - 1 individuals

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals

Sample 1661

Total sample weight: 1385 grams

Percentage of organic hard parts in sample: 0.1%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 1 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

two genera

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 2 individuals

Phylum MOLLUSCA

Class Bivalvia

Modiolus sp. juv. - 1 individuals

Spisula cf. S. catilliformis - 1 "

Mysella tumida - 1 "

Tellina salmonea - 13 "

Class Gastropoda

Olivella baetica - 2 individuals

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 1 individuals

"WORMS"

chitinous worm tubes - few

## Sample 1662

Total sample weight: 1065 grams

Percentage of organic hard parts in sample: 0.3%

## Phylum ARTHROPODA

## Class Crustacea

## barnacles

Balanus sp. - 2 individuals

## crabs

Cancer sp. - 1 "

## Phylum MOLLUSCA

## Class Bivalvia

Modiolus sp. juv. - 1 individualsSpisula cf. S. catilliformis - 1 "Macoma secta ? - 1 "Macoma sp. - 1 "Tellina salmonea - 11 "Tellina bodegensis - 1 "

## Class Gastropoda

Olivella baetica - 2 individuals

## Phylum ECHINODERMATA

## Class Echinoidea

Dendraster excentricus - 1 individuals

Sample 1663

Total sample weight: 1783 grams

Percentage of organic hard parts in sample: 0.6%

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 3 individuals

Phylum MOLLUSCA

Class Bivalvia

Ostrea lurida - 1 individuals

Spisula cf. S. catilliformis - 3 "

Clinocardium nuttallii - 1 "

Macoma sp. - 1 "

Tellina salmonea - 10 "

Class Gastropoda

Nassarius sp. - 1 individuals

Olivella baetica - 7 "

Phylum ECHINODERMATA

Class Echinoidea

Dendraster excentricus - 2 individuals

## Sample 1664

Total sample weight: 1618 grams

Percentage of organic hard parts in sample: 0.4%

## Phylum ARTHROPODA

## Class Crustacea

barnacles

Balanus sp. - 2 individuals

## Phylum MOLLUSCA

## Class Bivalvia

Spisula cf. S. catilliformis - 5 individualsMysella tumida - 3 "Tellina salmonea - 8 "Tellina bodegensis - 3 "

## Class Gastropoda

Nassarius perpinguis - 2 individualsOlivella baetica - 5 "

## Phylum ECHINODERMATA

## Class Echinoidea

Dendraster excentricus - 1 individuals



Sample 1665

Total sample weight: 926 grams

Percentage of organic hard parts in sample: 0.2%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 25 individuals
<u>Tricohyalus</u> sp.	- 2 "

Phylum BRYOZOA (Entoprocta and Ectoprocta)

one genus

Phylum ARTHROPODA

Class Crustacea

ostracods

<u>Pseudophilomedes</u> sp.	- 1 individuals
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Phylum MOLLUSCA

Class Bivalvia

<u>Nuculana taphria</u>	- 7 individuals
<u>Clinocardium nuttallii</u>	- 1 "
<u>Spisula</u> cf. <u>S. catilliformis</u>	- 3 "
<u>Siliqua patula</u>	- 3 "
<u>Mysella tumida</u>	- 5 "
<u>Macoma</u> sp.	- 2 "
<u>Tellina bodegensis</u>	- 15 "
<u>Nettastomella</u> sp.	- 1 "

Class Gastropoda

<u>Nassarius perpinguis</u>	- 2 individuals
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"WORMS"

chitinous worm tubes	- abundant
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Sample 1666

Total sample weight: 776 grams

Percentage of organic hard parts in sample: 0.06%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 6 individuals

Phylum BRYOZOA (Entoprocta and Ectoprocta)

one genus

Phylum ARTHROPODA

Class Crustacea

barnacles

Balanus sp. - 2 individuals

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Nuculana taphria - 4 individuals

Pandora bilirata ? - 1 "

Clinocardium nuttallii - 2 "

Mysella tumida - 2 "

Spisula cf. S. catilliformis - 40 "

Macoma sp. - 3 "

Tellina salmonea - 1 "

Tellina bodegensis - 8 "

Class Gastropoda

Olivella sp. - 2 individuals

Acteon? sp. - 1 "

"WORMS

chitinous worm tubes - few

Phylum VERTEBRATA

vertebrae - two specimens

## Sample 1667

Total sample weight: 2748 grams

Percentage of organic hard parts in sample: 0.1%

## Phylum ARTHROPODA

## Class Crustacea

barnacles

Balanus sp. - 3 individuals

## Phylum MOLLUSCA

## Class Bivalvia

Spisula cf. S. catilliformis - 1 individuals

## Class Gastropoda

Acmaea sp. juv. - 1 individualsOlivella baetica - 12 "

## Phylum ECHINODERMATA

## Class Echinoidea

Dendraster excentricus - 1 individuals

Sample 1668

Total sample weight: 1026 grams

Percentage of organic hard parts in sample: 0.05%

Phylum PROTISTA  
Order Foraminifera

Elphidiella hannai - 1 individuals

Phylum ARTHROPODA  
Class Crustacea

barnacles  
Balanus sp. - 1 individuals

Phylum MOLLUSCA  
Class Bivalvia

Nuculana taphria - 1 individuals  
Pandora bilirata - 1 "  
Protothaca staminea - 2 "  
Siliqua sp. - 1 "  
Spisula cf. S. catilliformis - 9 "  
Tellina bodegensis - 3 "

Class Gastropoda

Olivella sp. - 1 individuals

Phylum ECHINODERMATA  
Class Echinoidea

Dendraster excentricus - 1 individuals

"WORMS"

chitinous worm tubes - few

## Sample 1669

Total sample weight: 1431 grams

Percentage of organic hard parts in sample: 0.2%

## Phylum ARTHROPODA

## Class Crustacea

## ostracods

Pseudophilomedes sp. - 1 individuals

## barancles

Balanus sp. - 3 "

## Phylum MOLLUSCA

## Class Bivalvia

Nuculana sp. - 1 individualsProtothaca staminea - 1 "Clinocardium nuttallii - 1 "Siliqua sp. - 1 "Mysella tumida - 1 "Spisula cf. S. catilliformis - 9 "Macoma sp. - 2 "Tellina bodegensis - 9 "

## Class Gastropoda

Olivella baetica - 1 individualsMangelia barbarensis - 1 "Acteon? sp. - 1 "

## "WORMS"

chitinous worm tubes - few

## Phylum VERTEBRATA

vertebrae - one specimen

Sample 1670

Total sample weight: 793 grams

Percentage of organic hard parts in sample: 0.2%

Phylum PROTISTA

Order Foraminifera

Elphidiella hannai - 25 individuals

Phylum ARTHROPODA

Class Crustacea

ostracods

Pseudophilomedes sp. - 1 individuals

barnacles

Balanus sp. - 1 "

Phylum MOLLUSCA

Class Bivalvia

Nuculana taphria - 4 individuals

Yoldia ? sp. - 1 "

Protothaca staminea - 8 "

Cooperella ? sp. - 1 "

Spisula cf. S. catilliformis - 1 "

Mysella tumida - 6 "

Macoma sp. - 1 "

Tellina bodegensis - 3 "

Class Gastropoda

Nassarius sp. - 1 individuals

Odostomia sp. - 4 "

"WORMS"

chitinous worm tubes - few

Sample 1671

Total sample weight: 1743 grams

Percentage of organic hard parts in sample: 0.3%

Phylum PROTISTA  
Order Foraminifera

Elphidiella hannai - 75 individuals

Phylum ARTHROPODA  
Class Crustacea

ostracods

Pseudophilomedes sp. - 9 individuals

barnacles

Balanus sp. - 3 "

crabs

Cancer sp. - 1 "

Phylum MOLLUSCA  
Class Bivalvia

Nuculana taphria - 11 individuals

Pandora bilirata - 6 "

Protothaca staminea - 13 "

Clinocardium nuttallii - 1 "

Mysella tumida - 16 "

Spisula cf. S. catilliformis - 6 "

Axinopsida sericata - 3 "

Siliqua sp. - 1 "

Macoma sp. - 3 "

Tellina bodegensis - 28 "

Class Scaphopoda

Cadulus sp. - 1 individuals

Class Gastropoda

Nassarius perpinguis - 2 individuals

Mitrella gouldii - 1 "

Mangelia barbarensis - 1 "

Odostomia sp. - 3 "

"WORMS"

chitinous worm tubes - abundant

Sample 1673

Total sample weight: 583 grams

Percentage of organic hard parts in sample: 0.1%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 35 individuals
<u>Massilina</u> sp.	- 1 "

Phylum ARTHROPODA

Class Crustacea

ostracods

<u>Pseudophilomedes</u> sp.	- 2 individuals
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crabs

<u>Cancer</u> sp.	- 1 "
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Phylum MOLLUSCA

Class Bivalvia

<u>Nuculana taphria</u>	- 7 individuals
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<u>Protothaca staminea</u>	- 1 "
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<u>Clinocardium nuttallii</u>	- 1 "
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<u>Mysella tumida</u>	- 7 "
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<u>Solen</u> sp.	- 1 "
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<u>Spisula</u> cf. <u>S. catilliformis</u>	- 1 "
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<u>Macoma</u> sp.	- 1 "
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<u>Axinopsida sericata</u>	- 1 "
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<u>Tellina bodegensis</u>	- 18 "
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Class Gastropoda

<u>Mitrella gouldii</u>	- 1 individuals
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<u>Odostomia</u> sp.	- 1 "
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"WORMS"

chitinous worm tubes	- few
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## Sample 1674

Total sample weight: 308 grams

Percentage of organic hard parts in sample: 0.2%

## Phylum PROTISTA

## Order Foraminifera

<u>Elphidiella hannai</u>	- 30 individuals
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## Phylum ARTHROPODA

## Class Crustacea

## ostracods

<u>Pseudophilomedes</u> sp.	- 7 individuals
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## barnacles

<u>Balanus</u> sp.	- 2       "
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## Phylum MOLLUSCA

## Class Bivalvia

<u>Nuculana taphria</u>	- 3 individuals
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<u>Protothaca staminea</u>	- 5       "
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<u>Mysella tumida</u>	- 7       "
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<u>Spisula</u> cf. <u>S. catilliformis</u>	- 1       "
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<u>Axinopsida sericata</u>	- 1       "
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<u>Tellina bodegensis</u>	- 12       "
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## "WORMS"

chitinous worm tubes	- few
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Sample 1675

Total sample weight: 1173 grams

Percentage of organic hard parts in sample: 0.2%

Phylum PROTISTA  
Order Foraminifera

Elphidiella hannai - 70 individuals

Phylum ARTHROPODA  
Class Crustacea

ostracods

Pseudophilomedes sp. - 8 individuals

Phylum MOLLUSCA  
Class Bivalvia

Nuculana taphria - 8 individuals

Protothaca staminea - 3 "

Siliqua sp. - 1 "

Mysella tumida - 11 "

Axinopsida sericata - 4 "

Macoma sp. - 2 "

Tellina bodegensis - 11 "

Class Scaphopoda

Cadulus sp. - 1 individuals

Class Gastropoda

Olivella baetica - 1 individuals

Mitrella gouldii - 1 "

Mangelia barbarensis - 1 "

Odostomia sp. - 1 "

Acteon ? sp. - 1 "

"WORMS"

chitinous worm tubes - few

agglutinated worm tubes - few

Sample 1676

Total sample weight: 1404 grams

Percentage of organic hard parts in sample: 0.2%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 120 individuals
<u>Nonionella</u> sp.	- 5 "

Phylum ARTHROPODA

Class Crustacea

ostracods	
<u>Pseudophilomedes</u> sp.	- 40 individuals
barnacles	
<u>Balanus</u> sp.	- 2 "
crabs	
<u>Cancer</u> sp.	- 1 "

Phylum MOLLUSCA

Class Bivalvia

<u>Nuculana taphria</u>	- 24 individuals
<u>Modiolus</u> sp. juv.	- 1 "
<u>Siliqua</u> sp.	- 6 "
<u>Solen</u> sp.	- 1 "
<u>Mysella tumida</u>	- 105 "
<u>Cooperella subdiaphana</u>	- 1 "
<u>Spisula</u> cf. <u>S. catilliformis</u>	- 1 "
<u>Axinopsida sericata</u>	- 1 "
<u>Macoma</u> sp.	- 9 "
<u>Tellina bodegensis</u>	- 12 "

Class Scaphopoda

<u>Cadulus</u> sp.	- 1 individuals
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Class Gastropoda

<u>Nassarius perpinguis</u>	- 2 individuals
<u>Mitrella gouldii</u>	- 13 "
<u>Mangelia barbarensis</u>	- 1 "
<u>Odostomia</u> sp.	- 4 "
<u>Turbonilla</u> sp.	- 2 "

Sample 1676 cont.

"WORMS"

chitinous worm tubes	- abundant
agglutinated worm tubes	- few

Sample 1677

Total sample weight: 511 grams

Percentage of organic hard parts in sample: 0.1%

Phylum PROTISTA

Order Foraminifera

<u>Elphidiella hannai</u>	- 35 individuals
<u>Massilina</u> sp.	- 1 "
<u>Nonionella</u> sp.	- 1 "

Phylum ARTHROPODA

Class Crustacea

ostracods	
<u>Pseudophilomedes</u> sp.	- 17 individuals
barnacles	
<u>Balanus</u> sp.	- 1 "

Phylum MOLLUSCA

Class Bivalvia

<u>Nuculana taphria</u>	- 3 individuals
<u>Siliqua patula</u>	- 5 "
<u>Solen</u> sp.	- 1 "
<u>Mysella tumida</u>	- 27 "
<u>Axinopsida sericata</u>	- 1 "
<u>Macoma</u> sp.	- 4 "
<u>Tellina bodegensis</u>	- 1 "

Class Gastropoda

<u>Mitrella gouldii</u>	- 1 individuals
<u>Mangelia barbarensis</u>	- 1 "

"WORMS"

chitinous worm tubes	- abundant
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Phylum VERTEBRATA

vertebrae	- one specimen
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