Final Report
Research Unit #623

ECOLOGICAL CHARACTERIZATION OF SHALLOW SUBTIDAL HABITATS IN THE NORTH ALEUTIAN SHELF

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SECTION 1.0

SUMMARY

An integrated series of studies was conducted in the North Aleutian Shelf of the Bering Sea in 1982-83 to provide information for the assessment of potential impacts of oil and gas exploration and development on benthic biota-sea otter interactions. Most of the previous studies in the Bering Sea were conducted further offshore, removed from the large sea otter population. The objectives of the study were to determine the distribution of the major infaunal and epifaunal communities, the seasonal distribution and abundance of sea otters, the trophic relationships between sea otters and the benthic communities and the impacts of oil and gas exploration and development on these relationships. Three cruises were conducted during the spring, summer and fall of 1982 to investigate the benthic systems and to collect sea otter scats; four aerial surveys were flown during these same periods, as well as in March 1983, to investigate seasonal changes in sea otter habitat use.

The nearshore, shallow habitat (0-20 m) is homogeneous and consisted of well-sorted sands inhabited by an infaunal community with few species characterized by the razor clam Siliqua patula. Deeper habitats were more variable, with areas near the coastal embayments dominated by sand and inhabited by a rich infaunal community dominated by the sand dollar Echinarachnius parma and clams. Other deep areas removed from the embayments had greater amounts of gravel and are inhabited by a third, rich infaunal community characterized by polychaetes, particularly Oweni a. The major epifaunal communities were dominated by yellowfin and rock sole and overlapped more with each other than did the infaunal communities. The distribution of thses communities corresponded with substrate type and distance from embayments.

Sea otter abundance varied significantly with season, with the population nearly ten times greater in the summer than the winter. Highest habitat usage was in the Izembek Lagoon region and along the shallow, nearshore areas. Seasonal migration of the population is believed to occur from the Pacific through False Pass and Bechevin Bay into the Bering Sea. Seasonal and spatial distribution and abundance corresponded with the abundance of flatfish and crabs. The population of sea otters is believed to be feeding in the study area primarily on a diet composed of crabs, bivalves, fish and perhaps sand dollars, all of which are abundant in the benthos and are consistent with results from other Alaskan areas. The size of the sea otter population in the summer of 1982 did not differ significantly with results obtained in 1976. The movement of ice into the study area during the winter and spring of 1982 did not appear to affect the population significantly since most of the population was not present in the study area at that time.

A review of the literature indicates that oil slicks and blow-outs pose the most serious threats to the sea otter, particularly by fouling their fur. Additional impacts have been more indirect and involve disturbing feeding activity by blocking foraging areas or tainting prey items and/or sediments. The region off Izembek Lagoon, which was located in the study area, and probably Bechevin Bay and False Pass as well, are considered critical habitats to this population of sea otters. Additional sea otter studies on seasonal migration, population structure, feeding biology and responses to oil are recommended to more accurately determine potential impacts of oil and gas exploration and development.

SECTION 2.0

INTRODUCTION

2.1 Scope of Study

Proposed oil and gas exploration and development in the North Aleutian Shelf area of the Bering Sea has resulted in the need to provide the Bureau of Land Management (BLM) with information needed to make decisions and recommendations regarding oil lease areas; studies providing this information are managed through the Ocean Assessments Division of the National Ocean Services in the National Oceanic and Atmospheric Administration (NOAA).

The North Aleutian Shelf and Bering Sea in general is one of the richest fishery areas in the world and supports large populations of marine mammals, including sea otters. In contrast to the vast amount of information known about the deeper offshore areas, considerably less is known regarding the physical habitats, biota and dynamics of the nearshore system. This study investigated the benthic components of the nearshore ecosystem and their structural and functional interactions with the local sea otter population.

2.2 Specific Objectives

The specific objectives of this study were to describe: 1) the physical environment; 2) the dominant infaunal communities; 3) the dominant epifaunal communities; 4) the local sea otter population; 5) the prey of the sea otters and the dominant epibenthos; and 6) the potential impacts of oil and gas exploration and development on sea otter-benthic interactions.

2.3 Relevance to Petroleum Development

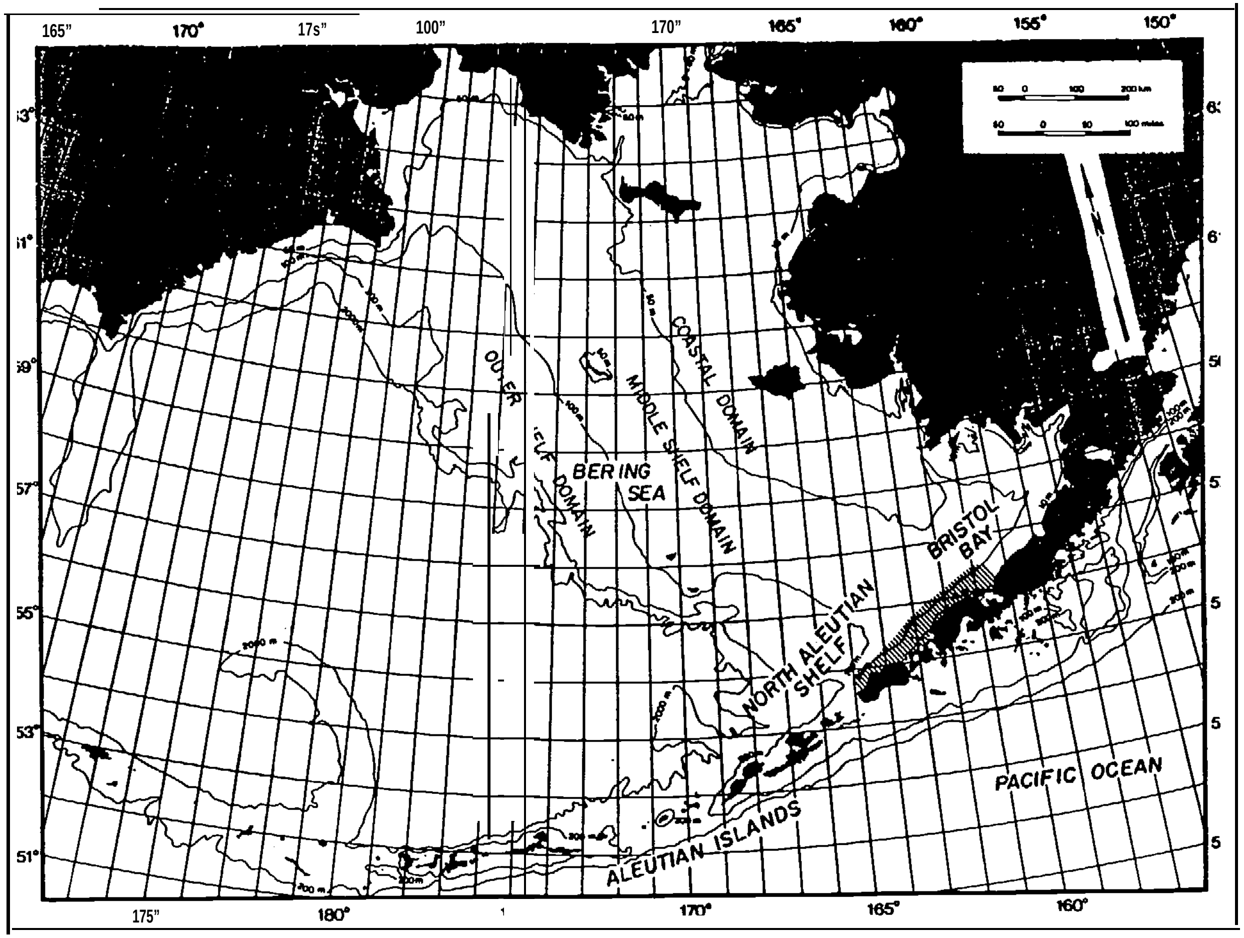
This study provides the first intensive investigation of the dominant and ecologically important bottom communities in the nearshore region and their importance to the sea otter population. This information provides the basis for addressing specific issues regarding impacts of oil and gas exploration and development on the biota. The impacts on the sea otter need to be addressed due to their status as a threatened species and their role as a top carnivore in the area. Studies on the distribution of the dominant epifaunal organisms and communities are important since many of the finfish and shellfish species are commercially important and are prey items of the otters. Investigations of the dominant infaunal communities provide additional information on both prey items of the sea otter and important epifauna. Understanding trophic interactions among the infauna, epifauna and sea otter is important since impacts may occur directly on the otter and/or indirectly on their feeding, an activity that requires approximately 30 percent of their time. Finally, knowledge of the physical environment enables an integration of the physical factors, infauna, epifauna and sea otters and provides an understanding of the forces that drive this sys tern.

SECTION 3.0

STUDY AREA

The study was conducted in the North Aleutian Shelf (NAS) which is located in the southeast portion of the Bering Sea (Figure 3.0-1). This area represents the southwestern extension of the coastal domain, a nearshore hydrographic region defined as the area of the Continental Shelf landward of the 50 m isobath. Other areas of the Bering Sea, the Middle Shelf Domain (50-100 m in depth) and Outer Shelf Domain (100-200 m in depth), have received more attention (see Section 4.0).

The initial study area extended from Cape Mordvinof on Unimak Island to Cape Leontovich on the Alaska Peninsula and included the area from shore to the 50 m contour (Figure 3.0-2). These boundaries marked the highest concentration of sea otters in the area according to Schneider (1976). The study area was later extended west to Cape Sarichef and east to Cape Seniavin, and offshore to 60 m to accommodate field time with other projects. The added area is inhabited by a smaller number of otters and therefore provides a contrasting environment to the original, high dense otter habitat around Izembek Lagoon and Bechevin Bay.



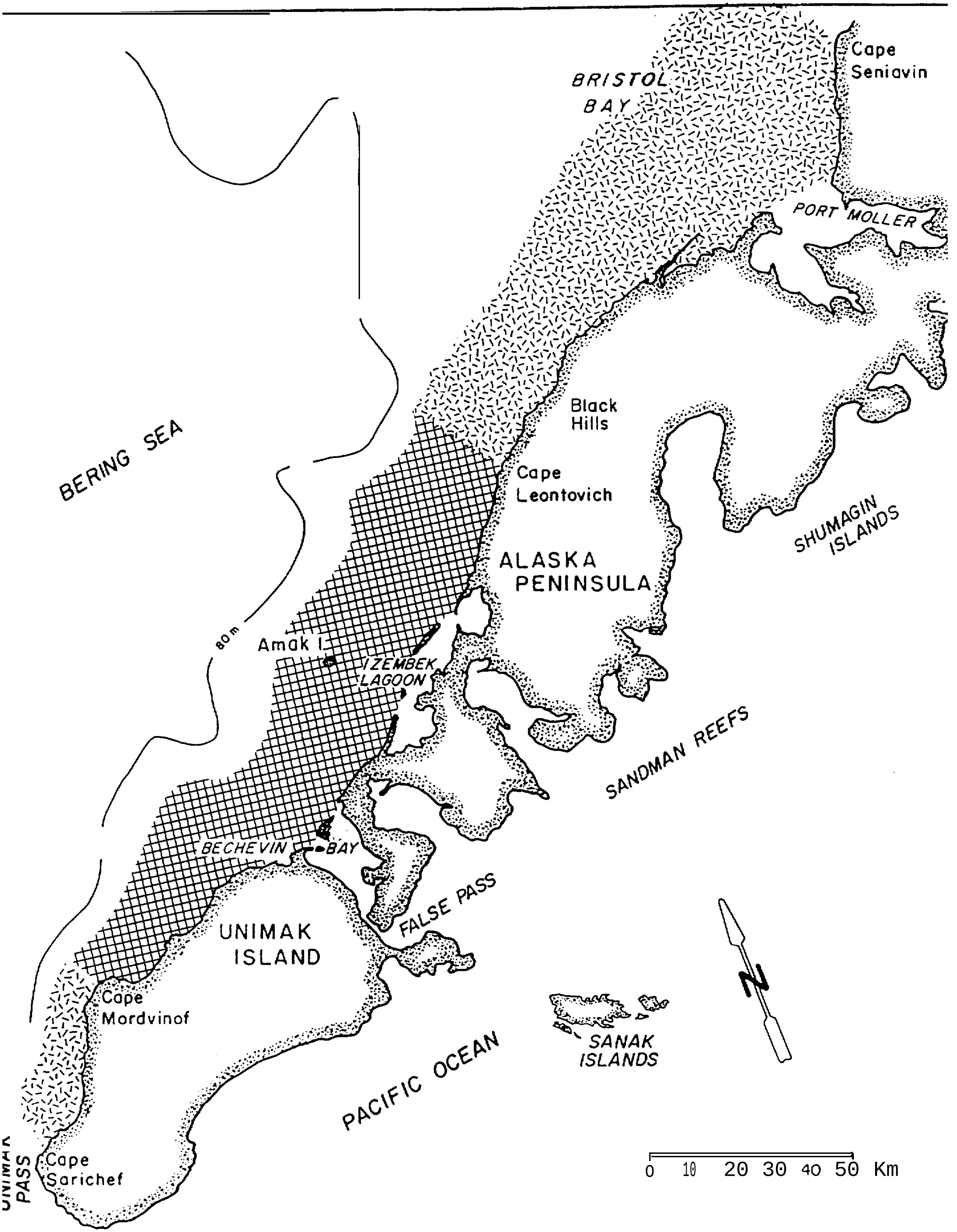
= STUDY AREA

NORTH ALEUTIAN SHELF

LOCATION OF STUDY AREA

Map: Bering Sea

1982 -198s | FIGURE 3 .0.1



= INITIAL STUDY AREA

= **EXPANDED STUDY** AREA

VTN

NORTH ALEUTIAN SHELF

MAP OF STUDY AREA

1982-1983	FIGURE 3.0-2

SECTION 4.0

CURRENT STATE OF KNOWLEDGE

The number and scope of studies in the NAS region have increased in recent years as a result of interest in oil and gas exploration and development in the area. Much of this literature has been summarized in the form of review articles (Hood and Calder 1981) and as reports from synthesis meetings (Armstrong, et al. In prep.; Thorsteinson and Thorsteinson 1982). The following discussion highlights the current state of knowledge for the NAS, especially the nearshore area.

Physical Environment. Overall hydrographic conditions and processes on the eastern Bering Sea shelf are dominated by seasonal advances and retreat of ice cover and extensive fresh water discharge during spring and summer (Ingraham 1981). Ingraham (1981) identified three domains with distinct differences in water mass characteristics (Figure 3.0-1). The inner, or coastal domain extends landward from the 50 m isobath, forming a narrow region along the northern shore of the Alaska Penninsula. Water in the coastal domain is well mixed due to hydrographic and climatological events and as a result is hydrographically separated from the vertically stratified regime found seaward. A weak cyclonic circulation is evident around the perimeter of Bristol Bay in the coastal zone (Cline, et al. 1981). Seasonal variability within the study area has not been investigated.

The coastal zone of the NAS has not been extensively sampled for sediment characterization. Results from a small number of stations have been reported by Burrell, et al. (1981), Haflinger (1981) and McDonald, et al. (1981). Results indicate that the nearshore zone has sediments composed primarily of coarse to fine sands as well as silt; gravel areas were found off Unimak Pass and to the northeast of Port Moller. Alongshore and offshore variability in the study area has not been examined.

Benthic Infauna. Most of the information available concerning benthic infauna of the nearshore zone has been reviewed in Hood and Calder (1981). Previous infaunal surveys noted a higher biomass of invertebrates in the nearshore region offshore than at greater depths of the southeast Bering Sea shelf (Feder and Jewett 1981; Haflinger 1981). Specific studies on the distribution and abundance of selected bivalves species were conducted off Izembek Lagoon and Port Heiden (McDonald et al. 1981) and between Port Moller and Ugashik Bay (Hughes and Bourne 1981). Studies have not examined alongshore and offshore variability within the study area.

Benthic Epifauna. The benthic epifauna has been poorly sampled in the nearshore zone of the southeastern Bering Sea. A few stations were sampled between Unimak Island and Port Heiden by Feder and Jewett (1980); results indicate that red king crabs, Tanner crabs and seastars were the dominant organisms, The pelagic fish, bottom fish and shellfish resources of the Bering Sea have been extensively studied in deeper waters in relation to the commercial efforts directed towards a number of important species including:

Paralithodes camtschatica	Red king crab
Chionoecetes bairdi	Tanner crab bairdi
C. opilio	Tanner crab opilio
Theragra chalcogramma	Walleye pollock
Gadus macrocephalus	Pacific cod
Limanda aspera	Yellowfin sole
Hippoglossus stenolepis	Pacific halibut
Clupea harengus pallasi	Pacific herring
Lepidopsetta bilineata	Rock sole
Hippoglossoides elassodon	Flathead sole
Pleuronectes quadritubercalatus	Alaska plaice
Isopsetta isolepis	Butter sole

The nearshore area is important for the migration of some organisms and perhaps as nursery and rearing area for several species (Bakkala 1981; Best 1981; Favorite and Laevastu 1981; Pereyra et al. 1976); Smith 1981;

Thorsteinson and Thorsteinson 1982; Wespestad and Barton 1981). Salmon are extensively fished in the Bristol Bay area, and the nearshore zone is an important habitat for migrating adults and juveniles (Straty 1981; Thorsteinson and Thorsteinson 1982).

Sea Otters. Information regarding the sea otter population in the area has been reviewed by Kenyon (1969) and Schneider (1976, 1981). They reported that the area supports a large population (over 15,000 otters) including some of the largest pods (1,000 individuals) ever observed. Winter ice is believed to limit the northeast extension of this population in Bristol Bay (Kenyon 1969; Schneider 1976, 1981). Studies regarding their seasonal habitat use have not been conducted.

Trophic Interactions. Knowledge of the feeding biology of otters is limited to gut analyses from three animals in the Bering Sea (Kenyon 1969). The data (volume of stomachs) indicate feeding primarily on clams, hermit crabs and fish. The trophic interaction between the shallow benthic communities and the sea otters has not been previously addressed.

SECTION 5.0

METHODS AND MATERIALS

This study involved the integration of several field programs to address the six objectives. A summary of the methods used is provided in Table 5.0-1 with details of the field and laboratory procedures for each task discussed in the following subsections. An outline of the seven field trips involved in these studies is provided in Table 5.0-2.

5.1 Physical Environment

Physical parameters pertinent to the biota, namely surface and bottom temperatures and salinities as well as sediment parameters, were measured. These were monitored along a sampling grid of 11 transects with four depth contours (10, 30, 50 and 60 m) in June, August and October of 1982 (Table 5.1-1 and Figure 5.1-1).

Temperature and salinity (or conductivity) data were measured using the NOAA vessels CTD system. Sediment samples were taken from 0.25 m^2 Van Veen grab; three replicate core samples were obtained by inserting a 3 cm tube through the grab sample. Contents were transferred to plastic bags, frozen and returned to the laboratory. Grain size analysis followed procedures in Standard Methods for Particle Size Analysis (ASTM 1972) with modifications (see Appendix A) . Data for each sample were reduced to calculate percent silt, percent sand, percent gravel, mean phi, geometric mean diameter (Loptspeich and Everest 1981) and sorting index (Krumbein and Pettyjohn 1938).

5.2 Benthic Infauna

Infaunal samples were taken with a Van Veen grab in order to provide comparable data to previous studies (Stoker 1981). An unweighed, 0.25

TABLE 5.0-1

SUMMARY OF METHODS USED FOR PROJECT TASKS

Task/Objectives	Equipment	Sampling Scheme	Data Generated	Products (Analysis)
1. Physical Factors Describe physical environment	0.25 m^2 Van Veen grab CTD	Grid of 11 transects with 4 depth contours in June, August, October 1982	Sediment parameters; surface and bottom temperatures, salinity	Spatial and seasonal means
2. Infauna Determine major infaunal communities	0.25 m^2 Van Veen grab	Grid of 11 transects with 4 depth contours; 1-5 replicates; June, August, October 1982	Densities of infaunal species greater than 1.0 mm	Dominant communities (cluster analysis); population trends (ANOVA/Duncan)
3. Epifauna Determine major epifaunal communities	Trynet trawl	Grid of 11 transects with 4 depth contours; 1-2 replicates; June, August, October 1982	Densities and biomass	Dominant communities (cluster analysis); population trends (ANOVA/Duncan)
4* Sea Otters Determine distribution/ abundance of sea otters	Aerial surveys	Contiguous quadrats (2 x 0.1 miles) along 43 transects	Densities	Population trends (ANOVA/Duncan)
5. Trophic Interactions Determine sea otter food web	Sea otter scats, fish guts	Beach surveys; 1 to 2 species of flatfish on 2 transects at 2 depths	Prey frequency per scat; prey number and volume per fish stomach	Fish, sea otter diets; area food web
6. Impact of Oil and Gas Determine impacts on sea otters and their habitat	Literature	Computer and manual searches		Impact-response matrix

TABLE 5.0-2

OUTLINE OF FIELD TRIPS

Dates	Data Collected A	T/S	S	I	E	G	SC	O[(a)]	Vessels or Aircraft
June 6-9, 1982	•								Gruman Goose
June 10 - July 2, 1982		•	•	O*				• 0	NOAA ship Miller Freeman; Monarch launch
August 4-9, 1982	•								Gruman Goose; Piper Navaho
August 9-24, 1982		•	•	C	c	o		• *	NOAA ship Miller Freeman; Monarch launch
October 15-23, 1982		•	•		--			• o	NOAA ship Discoverer
October 23-28, 1982	•								Piper Navaho
March 10-12, 1983	•								Piper Navaho

(a) A = Aerial surveys, sea otters
T/S = Temperature and salinity
s = Sediment cores
I = Infaunal grabs
E = Epifaunal trawls
G = Flatfish guts
SC = Sea otter scats
o = Sea otter feeding observations

TABLE 5.1-1

LIST OF BENTHIC STATIONS, DATES AND SAMPLES OBTAINED

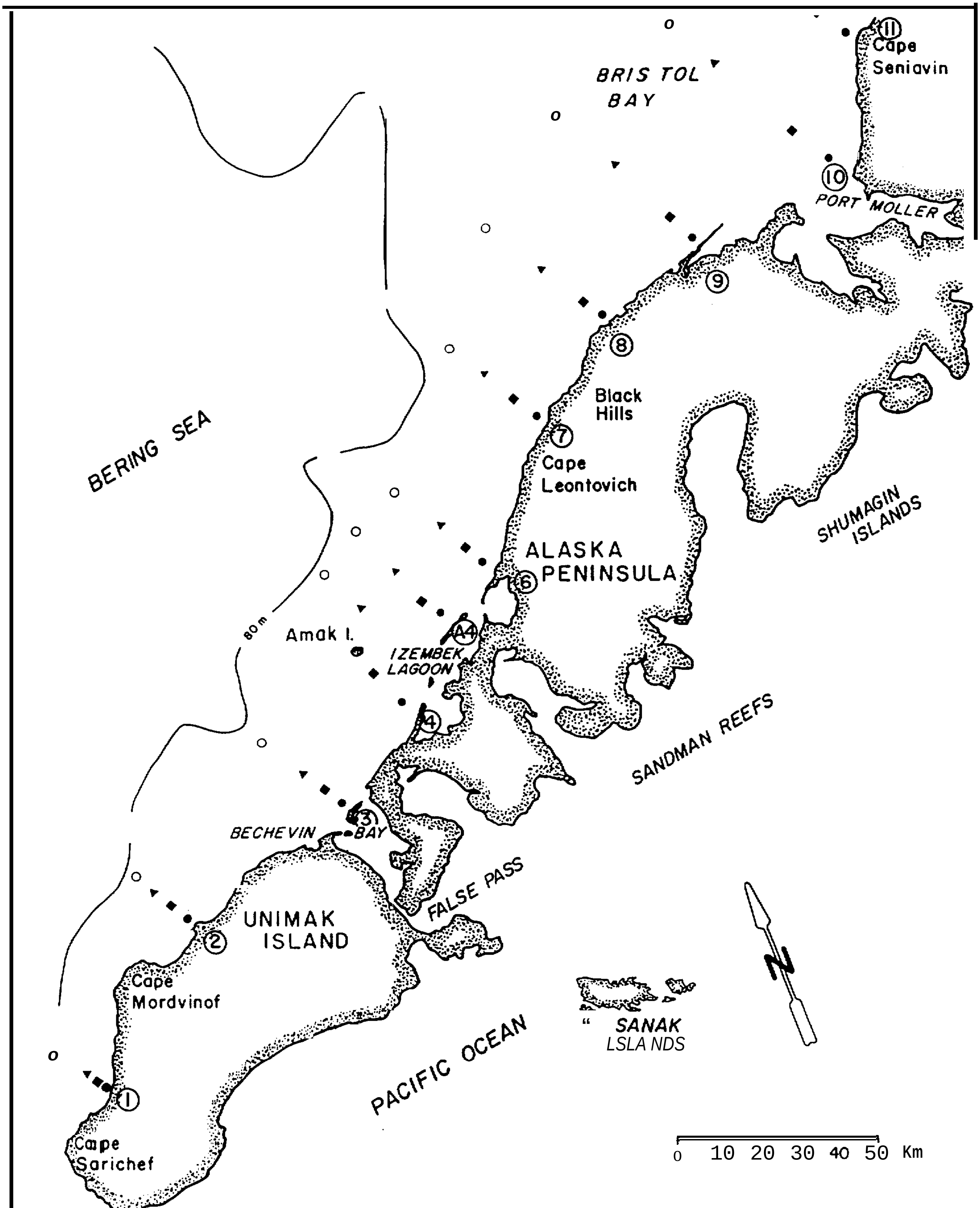
Station Transect	Depth Contour (m)	Location		Samples														
				June					August					October				
		Latitude	Longitude	H	S	I	E	G	H	S	I	E	G	H	S	I	E	G[a]
1	20	54°39.5’	164°45.1’	•	0		•					•						
	30	54°40.2’	164°45.3’				•					•						
	50	54°42.1’	164°49.0’				•					•						
	60	54°44.1’	164°48.8’								•	☚						
2	10	54°58.6’	164°06.1’	•	0	0												
	30	55°00.9’	164°09.6’	•	0	0	0							•	0	0	0	
	50	55°05.5’	164°13.9’	•	*	*	*										•	
	60	55°09.0’	164°24.0’								•	0		•	0	0	0	
3	10	55°06.3’	163°26.7′			•												
	30	55°07.2’	163°28.8′	•	*	*	*					•	*			•	,	
	50	55°13.8’	163°33.1′	•	*	*	O										•	
	60	55°20.2’	163°39.9′						•		•	•		•	*	b	*	
4	10	55°17.1’	162°58.0′			•	*											
	30	55021.2	163°01.8′	•	0	0			•	•				•	•	•	•	
	50	55°28.4’	163°07.8′			•	*											
	60	55°28.9’	163°23.1′						•		•	•		•	0		•	
A4	20	55°25.9’	162°50.2’									•						
	30	55028.1	162°53.2’									•						
	50	55°34.9’	162°58.2’									•						
	60	55°38.2’	163°04.0’								•	•						
6	10	55°15.4’	163°03.6′	•	•		•											
	30	55°31.8’	162°34.0′	•	0	0	0					•		•	*	*	*	
	50	55°41.8’	162°42.1′	•	O	*			•	•		•						
	60	55°44.4’	162°49.4′								•	•		•	*	*	*	
7	10	55°46.0’	162°07.7’	•	*	*	e					•						
	30	55°46.9’	162°09.8’			•						•		•	*	e		
	50	55°52.6’	162°16.4’	•	*	O						•					•	
	60	56°39.6’	160°27.3’								•						•	

TABLE 5.1-1

(continued)

Station Transect	Depth Contour (m)	Location		Samples														
				June					August					October				
		Latitude	Longitude	H	S	I	E	G	H	S	I	E	G	H	S	I	E	G[a]
8	10	55°54.7'	161°44.5'										•					
	30	55°58.3'	161°46.9'										•					
	50	56°01.6'	161°49.0'	•	*	O	*						•					•
	60	56°05.4'	161°55.3'									•	0					
9	30	56°05.2'	161°04.9'	•	✠	☛	☛							•				•
	50	56°11.5'	161°12.2'	•	o	*	a						•		•	O		•
	60	56°26.5'	161°07.2'				•				•			•				•
10	10	56°01.7'	160°37.4'	•	•	•												
	20	56°03.5'	160°43.6'										•					•
	30	56°09.8'	160°45.2'	•	0	0												•
	50	56°19.5'	160°53.7'	•	O	*												•
	60	56°26.4'	161°04.0'												•	•		•
11	10	56°24.0'	160°09.5'	•	m	*											•	
	30	56°29.6'	160°14.5'	•	*	*												•
	50	56°34.8'	160°20.4'	•	o	*												•
	60	56°35.1'	160°22.0'														•	O

(a) H = Hydrography (surface and bottom temperature, bottom salinity)
s = Sediment
I = Infauna
E = Epifauna
G = Guts, flatfish
• = Samples obtained



(#) = TRANSECT

● = 10 m
▼ = 30 m
◆ = 50 m
○ = 60 m

NORTH ALEUTIAN SHELF
GRID OF BENTHIC STATIONS

1982-1983 FIGURE 5.1-1

m2 grab was used in place of the desired weighted, 0.10 m^2 grab due to equipment unavialability. Samples were taken along a grid composed of 11 transects and four depth contours to survey the entire study area (Figure 5.1-1). Between one and five grabs were taken per station to compare within and between station variability. Samples were taken in June, August and October to examine seasonal variability of the infauna and for comparisons of available prey with sea otter abundance (Table 5.1-1).

Contents of each grab were sieved through a 1.0 mm screen, fixed with 10 percent buffered formalin and stained with rose bengal. Samples with large amounts of gravel were sorted in the field to separate the organisms from the large volume of retained sediments. In the laboratory, samples were sorted to major taxa and identified to the lowest practical taxonomic level and counted. Voucher samples of all species were sent to the California Academy of Sciences and the Smithsonian Institution.

Data analyses involved cluster analysis for community data and analysis of variance (ANOVA) for population data. Cluster analysis using EAP (1982) involved a square root transformation of al 1 data and appropriate standardizations (square root of species means for analysis of sites and square root of species maximum for analysis of species). Dissimilarities or distances among the entities (sites or species) were calculated using the Bray-Curtis index (Bray and Curtis 1957). Formation of the two dendrograms and the two-way matrix of site and species groups involved flexible sorting with the addition of a step across distances re-estimation for the species groupings and the two-way matrix.

Population data were first analyzed using ANOVA (SAS 1982) to determine which environmental factors (depth and area) corresponded significantly ($p<.05$) with abundance values. A general linear model was used since the number of replicates among the different parameters were not equal. A Duncan multiple range test was also conducted on these data to note significant variability among all combinations of factors (e.g., transect 1 - depth 10 m - October with transect 10 - depth 60 m - June).

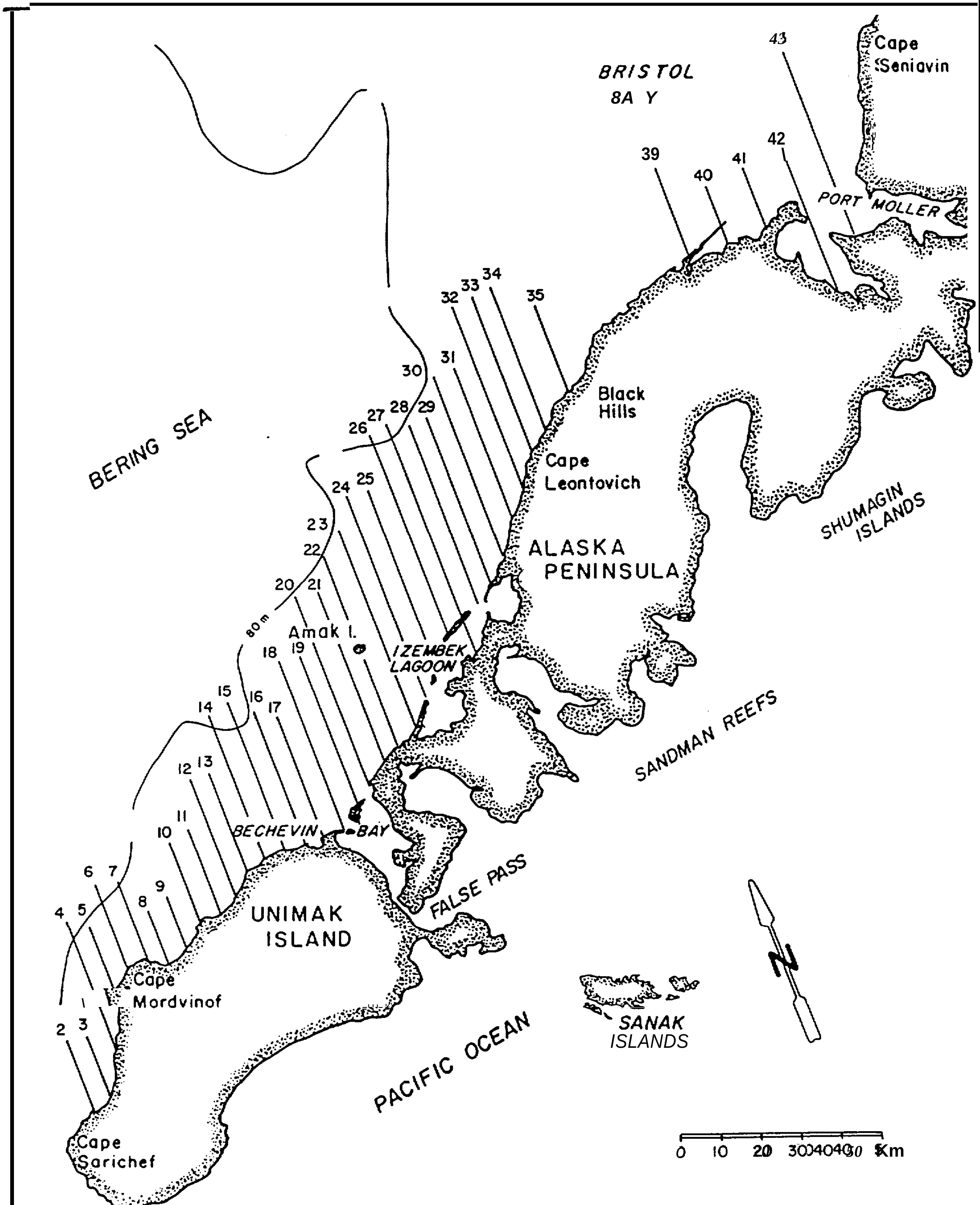
5.3 Benthic Epifauna

Epifaunal samples were taken with a trynet trawl equipped with a tickler chain to pick up organisms in the surface sediments. Originally an eastern otter trawl, fished for one-half to one hour, was chosen to provide results directly comparable to previous offshore studies. Such sampling resulted in over 11,000 pounds of fish caught per trawl and involved over 25 person hours to process. Instead, 20-minute trynet trawls were used since this procedure provided a more descrete sample of the bottom with less chance of sampling multiple habitats. Samples were taken during all three sampling dates and along the same sample grid as the physical data and infaunal samples (Table 5.1-1).

Fish and large invertebrates collected in the trawls were separated by species or the lowest practical taxonomic level, placed in pre-weighed baskets, weighed to the nearest ounce and counted. Smaller organisms were weighed on a triple beam or spring balance and counted. Al 1 species were vouchered. Vouchers were identified and/or verified in the laboratory. Data analyses were identical to those conducted for the infauna (Section 5.2) and involved cluster analyses for the community data and ANOVA/Duncan tests for the population data.

5.4 Sea Otters

The sea otter population was monitored using the same aerial transects and procedures establ i shed by Schneider (1976). These transects covered the entire study area and provided offshore variability out to 32 miles (Figure 5.4-1). Two observers were seated on each side of the plane. Each observer viewed a 0.1 mile strip of ocean below them using a strip of tape on the window as a guide to surface area. The plane flew along the transects at an altitude of 150-200 feet at 100 miles/hour. The total number of otters and presence of pups was logged along with the time from the beginning of the transect. These transects were flown in 1982 during June, August and October and in March 1983 to establish seasonal variability in habitat use (Table 5.4-l).



NORTH ALEUTIAN SHELF

AERIAL TRANSECTS SURVEYED

1982-1983

FIGURE 5.4-1

TABLE 5.4-1

LIST OF AERIAL TRANSECTS AND MONTHS SAMPLED

Transect	Longitude	1982 June	1982 August	1982 October	1983 March	Transect	Longitude	1982 June	1982 August	1982 October	1983 March
2	164°50'		•	•	•	22	163°10'		•	•	•
3	164°45'		•	•	•	23	163°05'	•	•	•	•
4	164°40'		•	•	•	24	163°00'		•	•	•
5	164°35'		•	•	•	25	162°55'	•	•	•	•
6	164°30'		•	•	•	26	162°50'		•	•	•
7	164°25'		•	•	•	27	162°45'	•	•	•	•
8	164°20'		•	•	•	28	162°40'		•	•	•
9	164°15'		•	•	•	29	162°35'	•	•	•	•
10	164°10'	•	•	•	•	30	162°30'		•	•	•
11	164°05'	•	•	•	•	31	162°25'	•	•	•	•
12	164°00'		•	•	•	32	162°20'		•	•	•
13	163°55'	•	•	•	•	33	162°15'	•	•	•	•
14	163°50'		•	•	•	34	162°10'		•	•	•
15	163°45'	•	•	•	•	35	162°00'	•	•	•	•
16	163°40'		•	•	•	39	161°20'	•	•	•	•
17	163°35'	•	•	•	•	40	161°10'	•	•	•	•
18	163°30'		•	•	•	41	161°00'	•	•	•	•
19	163°25'	•	•	•	•	42	160°50'	•	•	•	•
20	163°20'		•	•	•	43	160°40'	•	•	•	•
21	163°15'	•	•	•	•	Bechevin Bay		•	•	•	•
						Izembek Lagoon		•	•	•	•

• = Dates sampled

Data were treated in two manners. One method lumped all values per transect. From these values the population of the area was estimated following the procedures of Schneider (1976). The total number of otters counted was adjusted for the difference in size between the area counted (506 km^2) and the total study area (7,125 km^2). In June, poor weather precluded the sampling of all transects. This treatment resulted in an estimate of the total number of otters per transect per season. Duncan's multiple range test was conducted on these data to determine if there were significant differences ($p<.05$) among seasonal data.

Data were also grouped into contiguous quadrats, 0.1 mile wide by 2 miles long, along the transects. These data were extremely patchy with many quadrats having no otters, while a few quadrats contained many animals. Densities were therefore transformed by ranking each quadrat value; the largest value received the highest rank but only 1 higher than the next largest value regardless of the actual numerical difference. Populational analyses involving ANOVA and Duncan's multiple range tests as described in previous sections were conducted to determine significance of season, depth and along-shore variability.

5.5 Trophic Interactions

Trophic studies were conducted on two dominant species of fish, yellowfin (*Limanda aspera*) and rock sole (*Liopsetta bilineata*), as well as on the sea otters. Gut samples of the fish were taken in August along two transects at two depths to determine if flatfish diet varied in heavily used sea otter areas (transect 3) and depths (30 m) versus areas and depths of less use (transect 9 and 60 m, respectively) (Figure 5.1-1). Ten individuals of each species, covering their entire size range, were sampled. Size and sex was determined for each fish. Stomachs were removed and emptied; contents were sorted to species or lowest identifiable level , counted and volume estimated. All prey vouchers were identified and/or confirmed in the laboratory. Data were reduced to determine mean values per area and depth for each fish species.

Studies of sea otter prey were conducted by collecting scats in haulout areas and fixing them in 90 percent ethanol to prevent decalcification. These samples were sorted in the lab and identified by the same taxonomists who examined the benthic samples. Other methods were tried and proved less successful. Observations from land on Amak Island using sighting scopes were limiting since the sea otters were too far away for scientists to be able to observe prey items being ingested. Observations through binoculars from small skiffs were limited for the same reasons. Direct underwater observations of feeding were not successful during the 80 hours of dives made by scientists. Attempts to collect food scraps using SCUBA or trawl were not successful.

5.6 Impacts of Oil and Gas Development

Information concerning the impacts of oil and gas exploration and development on sea otters was obtained from the literature.

SECTION 6.0

RESULTS AND DISCUSSION

6.1 Physical Environment

Bathymetry. Though bathymetry was not monitored as part of this study, this physical factor is important in evaluating the quality and quantity of the sea otter habitat. Shallow water habitats are needed by the otters in order to forage since these animals cannot dive deeper than 60 m. Depth contours examined from NOAA charts indicate that shallow areas with depths less than 60 m is greater in the eastern part of the study area due to the gradual slope in this region (Figure 3.0-2). In addition, regions at the entrances to the two major embayments (Bechevin Bay-Izembek Lagoon and Port Moller) extend further inland than other areas. As a result, the shallow water areas of potential sea otter habitats are largest off these two coastal embayments.

Hydrography. Water temperatures and salinity values taken during each cruise are listed in the Appendix B. Mean values for each area and depth interval are presented in Table 6.1-1. Variability in the temperature data was noted with season, area and bottom depth. Mean surface water temperature over the study period was 6.6*C with highest temperatures in August (9.0°C), followed by October (6.9°C) and June (6.6°C). Mean bottom temperatures were likewise warmest in August (7.9°C), followed by October (6.9°C) and June (6.1°C).

Among subareas, temperatures of both surface and bottom waters were highest in the Izembek-Black Hills areas and lowest in the more peripheral portions of the study area. This difference could be attributed to warm waters moving from Bechevin Bay and/or Izembek Lagoon. These warm waters would be carried northeast along the counterclockwise gyre into the Black Hills area towards Port Moller (Kinder and Schumacher

TABLE 6.1-1

TEMPERATURE AND SALINITY VALUES

Area	Transects	June 0-20 (m)	June 21-40 (m)	June 41-60 (m)	August 0-20 (m)	August 21-40 (m)	August 41-60 (m)	October 0-20 (m)	October 21-40 (m)	October 41-60 (m)
Surface Temperatures (%)										
Unimak	1-2	6.0	6.2	-	7.9	7.9	8.4	6.6	6.8	6.8
Izembek	3-6	7.5	6.7	6.0	9.8	9.3	9.0	6.6	7.0	7.0
Black Hills	7-8	-	10.1	9.2	-	10*1	9.2		6.7	7.2
Port Moller	9-11	9.3	9.3	8.9	9.3	9.4	8.9	6.7	6.9	7.3
Bottom Temperatures (“C)										
Unimak	1-2	6.1	6.0	-	8.2	7.7	7.2	6.8	6.7	6.8
Izembek	3-6	6.3	6.2	5.0	9.0	8.7	6.6	6.8	6.9	6.9
Black Hills	7-8	7.5	7.1	-	9.5	9.2	7.3	7.0	6.9	7.1
Port Moller	9-11				9.2	9*2	7.5	7.1	6.8	7*3
Stratification (Surface-Bottom Temperatures)										
Unimak	1-2	-0.1	+0.2	-	-().3	+0.2	+1.2	-0.2	+0.1	0.0
Izembek	3-6	+1.2	+0.5	+1.0	+0.8	+0.6	+0.4	-0.2	+0.1	+0.1
Black Hills	7-8		-3.0	-	-	+0.9	+1.8		-0.2	+0.1
Port Moller	9-11				+0.1	+0.2	+1.4	-0.4	+0.1	0.0
Bottom Salinities (°/oo)										
Unimak	1-2						-	31.92	31.76	32.01
Izembek	3-6						-	31.81	31.76	32.07
Black Hills	7-8						-	31.72	31.65	31.97
Port Moller	9-11	-	-	-	-	-	-	31.37	31.10	32.26

= No data

1981). Water temperatures decreased also with depth. This trend was most evident in June and August; October temperatures were more uniform. The decreased stratification could be attributed to fall storms and decreased solar radiation.

Bottom salinity values were calculated for October. Values ranged from 31.10 to 32.26 $^{0}/oo$. Values varied with depth and area. Overall, the deepest depth interval (41-60 m) had the highest salinities. The mid-depth interval (21-40 m) had unexpectedly lower salinities than the shallow depth ranges (0-20 m).

Shallow salinities (0-20 and 21-40 m) each showed an alongshore trend. Salinities were lower along transects closer to Port Moller. This could be attributed to greater surface runoff in this region. The inverse trend occurred at the deeper depth interval (41-60 m). Bottom salinities, with the exception of the Black Hills region, increased at transects closer to Port Moller.

Sediments. Sediment characteristics for each sample are presented in Table 6.1-2. The relationship between sediments and benthic communities presented in the table is discussed in Section 6.2. Most of the study area was composed of well-sorted sands, with gravel and silt components usually comprising a small proportion of the sedments. Variability in these components was noted between areas and depths (Table 6.1-3).

The abundance of sand per area ranged from a low of 33.9 percent at 21-40 m depth interval off Black Hills, to a high of 97.6 percent in the shallowest area off Izembek. Overall the largest percentages of sand (>92%) were found at all depth intervals in the Izembek area and at the shallow (0-20 m) and deep (41-60 m) depths in the other areas. The lowest percentages of sand (<88%) were found at intermediate depths (21-40 m) in the Black Hills, Unimak and Port Moller areas.

The abundance of gravel ranged from O percent in the Izembek area at 0-20 m and 41-60 m depth intervals to 64.8 percent in the Black Hills

TABLE 6.1-2

SEDIMENT CHARACTERISTICS AND BENTHIC COMMUNITIES

Transect	Depth (m)	Month	Infaunal Community	Gravel (%)	Sand (%)	Silt (%)	Mean Diameter (d_g)	Mean (Ø)	Sorting index (S_i)
1	30	June		0.6	87.4	12.0	0.15	2.74	1.31
1	50	June		0.7	85.7	13.6	0.14	2.84	1.31
2	10	June	I	0.1	93.6	6.3	O*15	2.74	1.27
2	30	June	11A	36.6	62.7	0.7	2.37	-1.24	3.07
2	30	October	11A	20.6	78.6	0.8	2.02	-1.01	1.77
2	50	June	11A	6.8	92.9	0.3	1.24	-0.31	1.64
2	60	October	I	0.0	99.2	0.8	0.39	1.36	1.47
3	30	June	IIB	0.1	93.3	6.6	0.15	2.74	1.21
3	50	June	IIB	0.0	94*5	5.5	0.18	2.47	1.29
3	60	October	IIB	0.0	99.3	0.7	0.76	0.40	1.52
4	10	June	I	0.0	97.6	2.4	0.18	2.47	1.28
4	30	August	-	5.2	94.3	O*5	2.06	-1.04	1.34
4	30	October	I	0.0	95.7	4*3	0.17	2.56	1.36
4	30	June	IIB	0.0	99.3	0.7	0.39	1.36	1.37
4	60	October	IIB	0.0	95.6	4.4	0.17	2.56	1.28
6	10	June		0.2	99.7	0.1	0.21	2.25	1.18
6	30	June	11A	65.9	32.3	1.8	4.91	-2.30	1.98
6	30	October		46.0	53.3	0.7	4.20	-2.07	1.98
6	50	June	IIB	0.0	98.1	1.9	0.19	2.02	1.25
6	50	August		0.0	97.6	2.4	0.23	2.12	1.37
6	60	October	IIB	0.0	97.6	2.4	0.21	2.25	1.26
7	10	June	I	0.0	93.0	7.0	0.14	2.84	1.21
7	30	October	11A	82.4	16.0	1.6	5.65	-2.50	1.56
7	50	June	11A	4.3	95.3	0.4	0.93	0.10	1.90
8	50	June	IIB	0.8	99.0	0.2	0.61	0.71	2.29
9	30	June	IIB	4.5	93.7	1.8	1*11	-0.15	1.88
9	30	June		0.0	98.0	2.0	0.24	2.06	1.23
9	60	October		0.2	99.4	0.4	0.25	2.00	1.26
9	50	June	IIB	0.0	97.2	2.8	0.22	2.18	1.19
10	10	June	I	0.0	97.3	2.7	O*17	2.56	1.28
10	30	June	IIB	0.1	98.0	1.9	0.19	2.40	1.26
10	50	June	IIB	7.0	92.0	1.0	0.77	0.38	2.64
10	60	October		0.0	98.8	1.2	0.21	2.25	1.22
10	60	October		0.0	99.3	0.7	O*21	2.25	1.22
11	10	October	IIB	3.9	95.6	0.4	1.63	-0.70	1.48
11	30	June	11A	8.6	88.3	3.1	1.29	-0.37	1.69
11	30	June		42.1	57.4	0.5	2.53	-1.34	3.37
11	50	June	IIB	0.5	96.6	2.9	0.31	1.69	1.38

- = Not sampled

TABLE 6.1-3

SUMMARY OF SEDIMENT CHARACTERISTICS BY AREA AND DEPTH

Area	Transects	Percent Sand by Depth (m) 0-20	21-40	41-60	Percent Gravel by Depth (m) 0-20	21-40	41-60	Percent Silt by Depth (m) 0-20	21-40	41-60
Unimak	1-2	93.6	76.2	92.6	0.1	19.2	2.5	6.3	4.5	4.9
Izembek	3-4	97.6	95.6	96.5	0.0	1.8	0.0	2.4	3.0	3.5
Black Hills	6-8	96.4	33.9	97.5	0.1	64.8	1.0	3.6	1.4	1.5
Port Moller	9-11	96.5	87.1	97.2	2.0	11.1	1.3	1.6	1.9	1.5

Area	Transects	Mean Diameter by Depth (m) 0-20	21-40	41-60	Mean Phi (Ø) by Depth (m) 0-20	21-40	41-60	Sorting Index(So) by Depth (m) 0-20	21-40	41-60
Unimak	1-2	0.15	1.51	0.59	2.74	0.16	1.30	1.27	2.05	1.47
Izembek	3-4	0.18	0.92	0.37	2.47	1.41	1.81	1.28	1.32	1.36
Black Hills	6-8	0.18	4.92	0.43	2.56	2.29	1.46	1.20	1.84	1.70
Port Moller	9-11	0.90	1.10	0.32	0.93	0.65	1.79	1.38	1.89	1.50

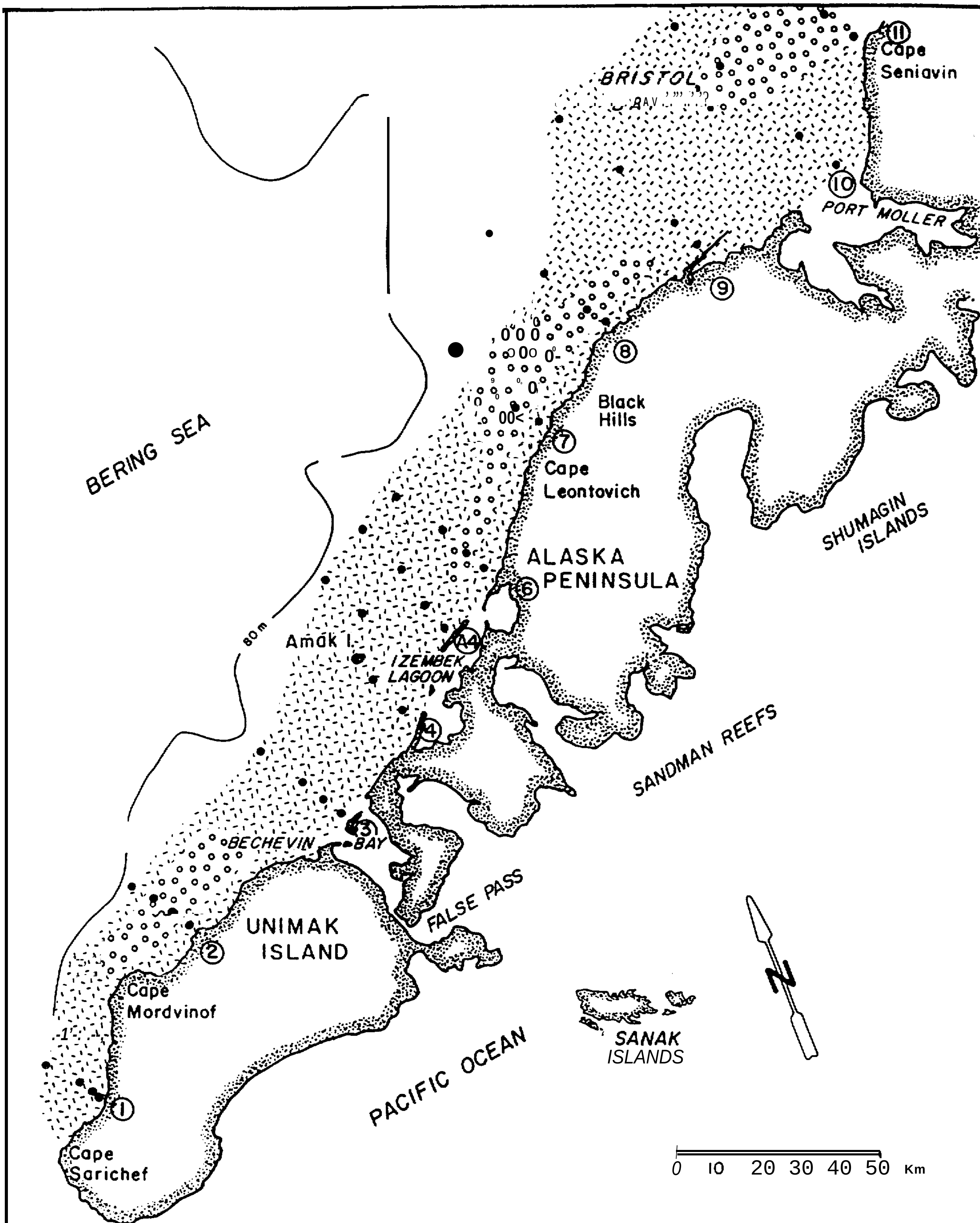
region at the 21-40 m depth interval . Overall, the Unimak and Black Hills areas had the highest gravel composition at the 21-40 m depth interval .

Silt composition per station ranged from 0.1 percenton transect 6 at 10 m to 12.0-13.6 percent on transect 1. Overall, the largest percentages were found in the Unimak area for all depth intervals, whereas the lowest percentages were found in the Port Moller area. The small percentage of silt east of Cape Mordvinof could be attributed to swifter currents which prevent most of these smaller particles from settling to the bottom.

Phi size provides a good index of overall grain size, with larger grain sizes having a smaller phi value. All sediment samples had a phi less than 3.0, indicating sandy substrates (Table 6.1-2). previous studies along the Bering Sea shelf at depths less than 60 m also reported sediments with phi sizes less than 3.0 (Sharma 1979). phi size varied with area and depth. The smallest phi values (less than +0.65) occurred at the 21-40 m depth interval in all areas except Black Hills. Conversely, the shallower (0-20 m) and deeper (41-60 m) intervals had a larger phi (>+1.30), or smaller grain size.

The variability of grain sizes within a sample was computed using a sorting coefficient (S_i). A perfectly sorted sample with no variability in grain size has a S_i of 1. The S_i values among individual samples ranged from 1.19 to 3.37. Sorting index values varied with area and depth. Well-sorted values (<1.71) occurred in the shallower (0-20 m) and deep (41-60 m) intervals for all areas as well as the 21-40 m interval for Izembek. The other areas (Unimak Island and Black Hills) had poorer sorted samples, particularly at 30 m. This trend is due to the mixed sand and gravel components in these areas.

Sediment composition was plotted for the entire study area in Figure 6.1-1; variability with depth and location can be noted along the shore.



• : STATION
(#) = TRANSECT
: SAND
= SAND AND >1% GRAVEL

NORTH ALEUTIAN SHELF
SPATIAL DISTRIBUTION OF
SOFT SEDIMENT TYPES

1982-1983

FIGURE 6.1-1

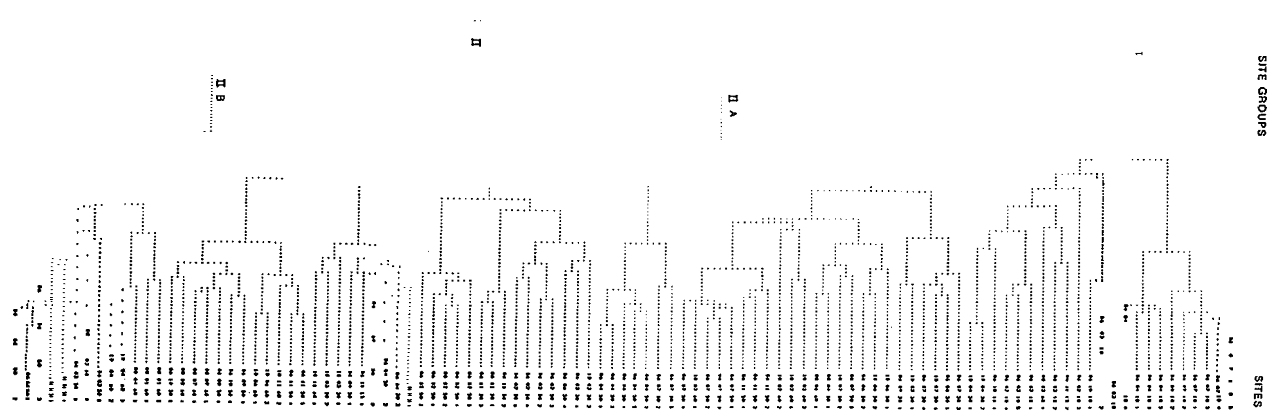
Substrates dominated by sand (93-99.4%) with low percentages of gravel (<1%) were found at all shallow water (10 m) and at deep water stations (50-60 m) near the two embayment systems, Izembek Lagoon-Bechevin Bay and Port Moller. Areas with sand (16.0-92.9%), but with greater amounts of gravel (1.0-82.4%), were found primarily at 30 m off central Unimak Island, Black Hills and Cape Seniavin, areas removed from these embayments.

The major components of the sediments were sand and gravel. The lack of silt, the large phi size and low sorting coefficient is attributed to a high energy environment. Water movement is strong enough to prevent the fine and medium sands from settling. Sharma (1979) noted that winter and summer surface waves have sufficient energy to move sediments at depths as deep as 40-60 m.

6.2 Benthic Infauna

A taxonomic species list of all organisms identified from the infaunal grabs is provided in Appendix C. This list indicates that species composition of the area is dominated by polychaetes, crustaceans, molluscs and echinoderms.

Raw data from each grab during the three cruises is presented in the Appendix D. Classification analysis of these data resulted in the generation of a dendrogram that grouped the sites (Figure 6.2-1). Inspection of this figure indicates the presence of two major site groups (1,11), with one composed of two subgroups (11A, IIB). Site groups represent different assemblages of organisms in different habitats and are therefore referred to as communities. The distribution of these three groups was compared with physical parameters (season, depth, transect location and grain size) to determine which one(s) corresponded best with and therefore could separate the three site groups. Results indicate that depth and percent gravel are the key physical factors separating communities (Figure 6.2-2). Such comparisons are not available for each sample since sediment samples were not taken for each biological grab.

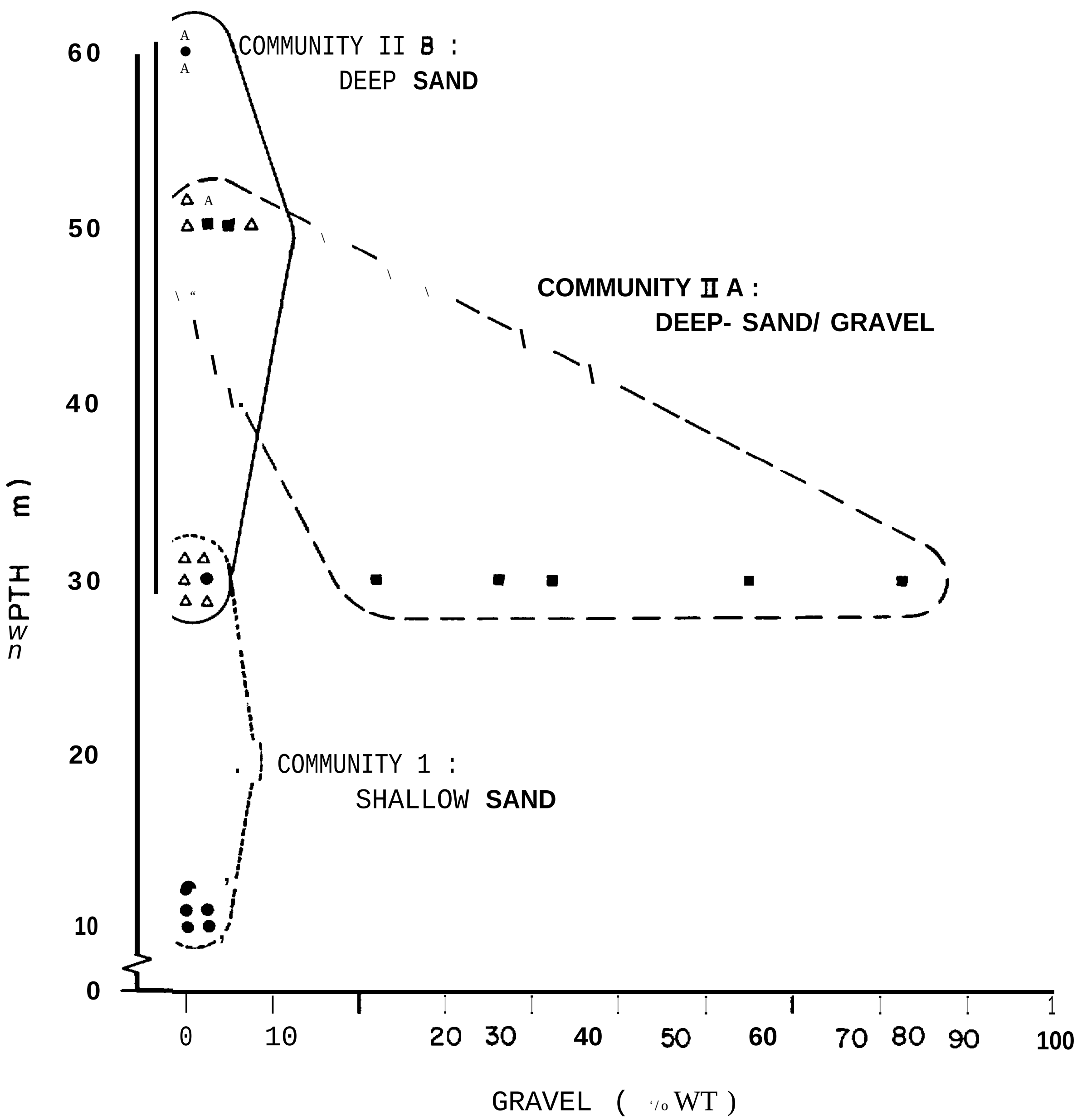


SITES MONTH-TRANSECT-DEPTH-REPLICATE

vtn

NORTH ALEUTIAN SHELF

SITE DENDROGRAM FROM
INFAUNAL SAMPLES



● COMMUNITY I
■ COMMUNITY II A
△ COMMUNITY II B

NORTH ALEUTIAN SHELF

DISTRIBUTION OF INFAUNAL COMMUNITIES WITH DEPTH AND SEDIMENT TYPE

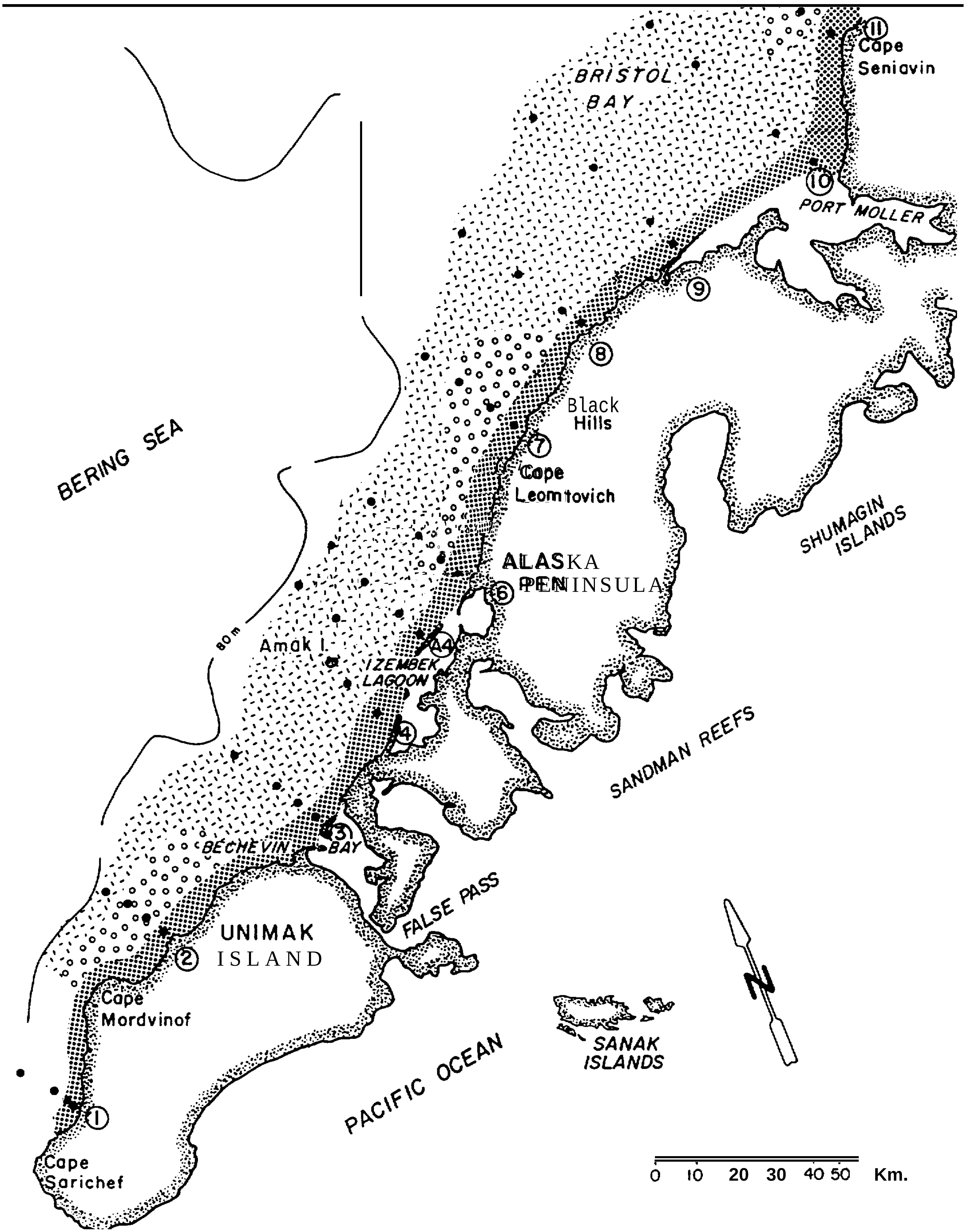
1982-1983 | **FIGURE 6.2-2**

The major communities differed in depth; community I was found primarily in shallower waters (10-3O m) than community II (30-60 m) (Figure 6.2-2). Environmental differences between the minor groups within community II were associated with gravel content of the sediments. Community 11A inhabited sediments with higher percentages of gravel (4.3-82.4%) than community IIB (0.1-7.0%).

An aerial map displays the distribution of the three infaunal communities (Figure 6.2-3). The nearshore shallow region (10 m depth) was homogeneous, composed predominantly of sand (93-99%) and inhabited by a single infaunal community. Deeper waters (30-60 m) were also composed predominantly of sand, but were more heterogeneous. Areas of larger gravel content, usually at 30 m, was inhabited by a community (11A) different from the one at the same depths with l ess gravel (IIB). The sand/gravel community (11A) was found off Unimak Island, Black Hills and Cape Seniavin. Areas near the coastal inlets (Bechevin Bay, Izembek Lagoon and Port Moller) were inhabited by the communities associated with sand in both deep (IIB) as well as shallow (I) waters.

Replicate samples (Figure 6.2-1) indicate that some local, small-scale variability did exist with two different communities sometimes found within the same station, but this was rare. No large-scale seasonal shifts in community distributions were noted.

Inspection of the species dendrogram (Figure 6.2-4) indicates the presence of three major species groups (A, B1 and 132). The two-way matrix (Figure 6.2-5) shows the relationship among sites and species. Species groups differed primarily by their distribution between high and low gravel areas and secondarily with depth. Species group A inhabited sandy sediments having lower gravel content than did species group B. Subgroup B1 was found in both shallow and deep waters, while subgroup B2 was restricted to deep waters.



● = STATION
(#) = TRANSECT

COMMUNITIES
= I - SHALLOW: SAND
= II A - DEEP: SAND/GRAVEL
= II B - DEEP: SAND

NORTH ALEUTIAN SHELF
SPATIAL DISTRIBUTION OF INFAUNAL COMMUNITIES

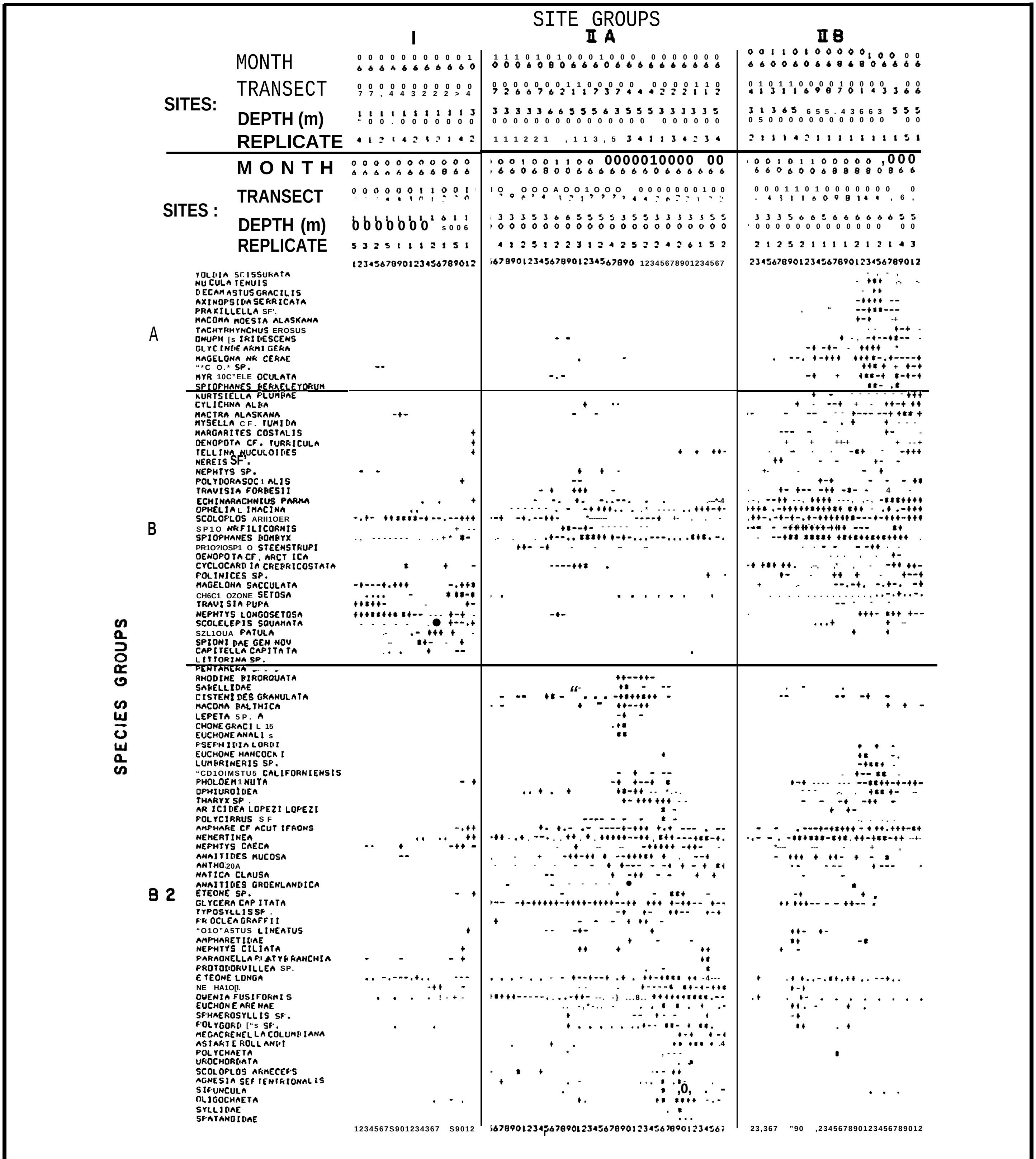
1982-1983 | FIGURE 6.2-3

NORTH ALEUTIAN SHELF

SPECIES DENDROGRAM FROM INFAUNAL SAMPLES

1982-1983

FIGURE 6.2-4



ABUNDANCE VALUES :

• = $(\sqrt{x}/\sqrt{\bar{x}}) \leq 0.5$

- = $(\sqrt{x}/\sqrt{\bar{x}}) > 0.5 \leq 1.0$

+ = $(\sqrt{x}/\sqrt{\bar{x}}) > 1.0 \leq 2.0$

✱ = $(\sqrt{x}/\sqrt{\bar{x}}) > 2.0$

vtn

NORTH ALEUTIAN SHELF

TWO-WAY SITE AND SPECIES MATRIX FROM **INFAUNAL** SAMPLES

1982-1983 | **FIGURE 6.2-5**

The two-way matrix also indicates which species groups and species were found in each community. The shallow water sand community (I) is composed essentially of species group B1. These were ubiquitous species within the study area and were found at all depths and in sediments with both high and low gravel content. The characteristic species were the bivalve *Siliqua patula*, along with the polychaetes *Capitella capitata*, *Magelona sacculata*, *Nephtys longosetosa*, *Scolopus armiger* and *Travisia pupa*.

The deep sand/gravel community (11A) also had many of the ubiquitous species in group B1 including the polychaetes *Scolopus armiger* and *Spiophanes bombyx*, as well as species in group B2 which inhabited gravel substrates, particularly the polychaetes *Owenia fusiformes*, *Eteone longs*, *Glycera capitata*, *Megacrenella columbiana* and *Polygordius* sp. The deep sand community was characterized by the sand dollar *Echinarachnius parma* as well as species from group B1, including the polychaetes *Ophelia limacina*, *Scolopus armiger*, *Spio* nr. *filicornis* and *Spiophanes bombyx*.

Further analysis was conducted on the two-way matrix to examine trophic differences among the three communities. Comparisons were made among different feeding types of polychaetes and their "preferred" habitat among the three communities (Table 6.2-1). A habitat preference was established if the given species was twice as common in any given community, otherwise the species was considered ubiquitous in the study area. This information was reduced into a matrix to examine the distribution of feeding types (Fauchald and Jumars 1979) among the three communities (Table 6.2-2). This analysis indicates that the number of polychaete species increased with depth, with the greatest number of species in the deep sandy areas. The relative abundance of feeding types (in descending order), namely selective deposit feeders, predators, non-selective deposit feeders, filter feeders and others, remained constant in the three communities. Filter feeders were found only in the deep habitats, particularly in the sand/gravel stations

TABLE 6.2-1

HABITAT PREFERENCE, BASED ON FREQUENCY OCCURRENCE, AND FEEDING TYPES FOR POLYCHAETE SPECIES

Species	Community I (Shallow) Sand	IIA (Deep) Sand/Gravel	IIB (Deep) Sand	Preferred(a) Habitat	Feeding Type(b)
	Frequency (%)				
Decamastus gracilis	0	0	12	Deep sand	Non-selective deposit
Praxillells sp.	4	2	27	Deep sand	Non-selective deposit
Onuphis iridesiens	0	4	36	Deep sand	Scavenger
Glycinde armiger	9	4	36	Deep sand	Predator
Magelona nr. cerae	4	2	64	Deep sand	Selective deposit
Myriochele oculata	4	9	42	Deep sand	Selective deposit
Spiophanes berkeleyorum	4	0	15	Deep sand	Selective deposit
Nereis sp.	4	4	24	Deep sand	Omnivore
Nephtys sp.	13	7	15	Ubiquitous	Predator
Polydora socialis	4	9	30	Deep sand	Selective deposit
Travisia forbesii	0	17	48	Deep sand	Non-selective deposit
Ophelia l-	13	70	88	Deep	Non-selective deposit
Scolopus armiger	91	67	100	Ubiquitous	Selective deposit
Spio nr. filicornis	22	35	61	Deep sand	Selective deposit
Spiophanes bombyx	70	83	76	Ubiquitous	Selective deposit
Prionospio steenstrupi	0	26	30	Deep	Selective deposit
Magelona sacculata	70	0	55	Sand	Selective deposit
Chaetozone setosa	48	24	76	Sand	Selective deposit
Travisia pupa	39	2	18	Sand	Non-selective deposit
Nepthys longosetosa	87	11	48	Sand	Carnivore
Scolelepis squamata	57	2	24	Sand	Selective deposit
Spionidae gen. nova	30	0	3	Shallow sand	Selective deposit
Capitella capitata	26	9	3	Shallow sand	Non-selective deposit
Rhodine birorquata	0	17	3	Deep gravel	Non-selective deposit
Sabellidae	4	15	9	Deep	Filter
Cistenides granulata	0	41	24	Deep	Selective deposit
hone gracilis	0	11	3	Deep	Filter
Euchone analis	0	11	6	Deep	Filter
Euchone hancocki	0	2	15	Deep sand	Filter
Lumbrineris sp.	0	13	24	Deep	?
Mediomastus californianus	9	13	24	Ubiquitous	Non-selective deposit
Phloe minuta	17	22	67	Deep sand	Predator
Tharyx Sp.	4	26	24	Deep	Selective deposit
Arcidea lopezi lopezi	4	7	15	Deep sand	Non-selective deposit
Polycirrus sp.	4	26	18	Deep	Filter

TABLE 6.2-1

(continued)

Species	I (Shallow) Sand	IIA (Deep) Sand/Gravel	IIB (Deep) Sand	preferred(a) Habitat	Feeding Type(b)
	Frequency (%)				
Ampare cf. acutifrons	22	61	73	Deep	Selective deposit
Nephtys caeca	35	41	36	Ubiquitous	Predator
Anaitides mucosa	26	52	39	Deep	Predator
Anaitides groenlandica	4	2	3	Ubiquitous	Predator
Eteone sp.	13	20	12	Ubiquitous	Predator
Glycera capitata	0	83	42	Deep	Predator
Typosyllis sp.	0	33	0	Deep gravel	Predator
Proclea graffii	0	22	3	Deep gravel	Filter
Notomastus lineatus	4	13	15	Deep	Non-selective depoist
Ampharetidae	9	9	18	Deep sand	Selective deposit
Nephtys ciliata	13	15	12	Ubiquitous	Predator
Paraonella platybranchia	17	7	9	Ubiquitous	Non-selective deposit
Protodorvillea sp.	0	9	0	Deep gravel	Predator
Eteone longa	65	76	67	Ubiquitous	Predator
Owenia fusiformis	35	98	45	Deep gravel	Selective deposit
Euchone arenae	0	41	18	Deep	Filter
Sphaerosyllis sp.	0	17	6	Deep gravel	Selective deposit
Polygordius sp.	9	41	15	Deep gravel	?
Scolopos armeceps	0	17	0	Deep gravel	Selective deposit
Syllidae	0	7	3	Deep gravel	?

(a) If frequency was twice as much as in any other community(ieS)

(b) From Fauchald and Jumars (1979)

TABLE 6.2-2

DISTRIBUTION OF POLYCHAETE FEEDING TYPES WITH THEIR PREFERRED HABITATS

Community Species	Preferred Habitat(a) I (Shallow) Sand	 11A (Deep) Sand/Gravel	 IIB (Deep) Sand	 1,11A, IIB(b) Obliquitous
Non-selective deposit	1	2	5	3
Selective deposit	7	11	17	3
Filter	o	6	4	0
Predator	7	10	10	7
Scavenger	o	0	1	0
Omnivore	o	0	2	0

(a) From Table 6.2-1
(b) Also accounted for in individual habitats

(possible indicator of greater water movement) than the strict sandy habitats. Predators were the least selective (most ubiquitous) in terms of habitat preference.

With the exception of McLaughlin's (1963) qualitative survey, no ecological investigations have been conducted in the shallow, nearshore areas of the Bering Sea. Studies by Haflinger (1981) in deeper waters indicated that differences between site groupings corresponded with depth. The nearshore study area with its high energy environment, coarse grain size and dominant species, Siliqua patula (razor clam) and Echinarachnius parma (sand dollar), are more similar to other high energy sandy habitats along the Pacific Coast than other areas of Alaska. In such habitats the primary distribution of infaunal communities occurs in zones from onshore to offshore with wave action being a primary factor regulating the break between zones (Jon Kastendiek, Univ. S. Calif., personal communication) and Oregon (Howard Jones, Oregon State Univ., personal communication).

6.3 Benthic Epifauna

A listing of all organisms collected in the epifaunal trawls is provided in Appendix C. A total of 185 epifaunal taxa were identified including 58 fish taxa, 121 invertebrate taxa and six plant taxa. Raw data from epifaunal samples from each cruise are provided in Appendix E. The taxa that occurred in 10 percent or greater of the trawl samples are listed in rank order in Table 6.3-1; the total and mean weight of each taxa are also presented in the table. The 27 taxa listed represented almost 92 percent of the total sample biomass and include 14 fish taxa, 12 invertebrate taxa and one plant taxon. Two species of flatfish, Limanda aspera (yellowfin sole) and Lepidopsetta bilineata (rock sole), were the most frequently captured taxa, occurring in at least 85 percent of the samples; two invertebrate taxa, Hipplytidae (shrimp) and Asterias amurensis (sea star) each occurred in more than 70 percent of the samples. Five taxa represented >6 percent of the total biomass

TABLE 6.3-1

RANKED ABUNDANCE DATA FROM EPIFAUNAL TRAWLS

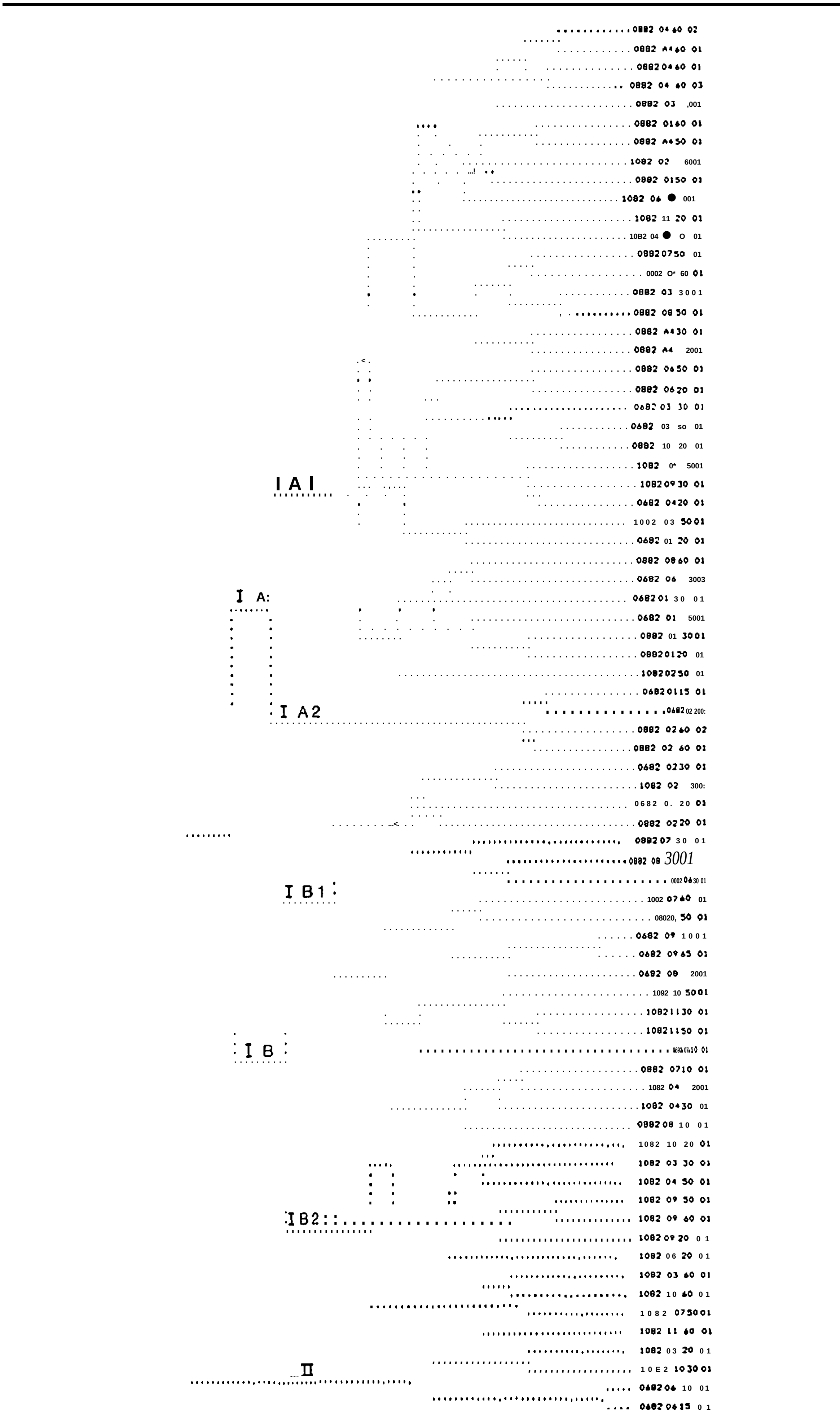
	Taxon	Number of Occurrences	Percent Frequency Occurrence	Total Weight(g)	Mean Weight(g)	Percent Weight	Cumulative Percent
1.	Limanda aspera	70	89	788,890.0	9,985.9	32.3	32.3
2.	Lepidopsetta bil ineata	67	85	415,579.0	5,260.5	17.0	49.4
3.	Hippolytidae	62	78	12,558.1	159.0	0.5	49.9
4.	Asterias amurensis	56	71	371,518.0	4,702.8	15.2	65.1
5*	Paguridae	45	57	8,797.3	111.4	0.4	65.5
6.	Gadidae, juv.	43	54	28,832.7	365.0	1.2	66.6
7.	Cottidae	38	48	43,693.0	553.1	1.8	68.4
8.	Boltenia ovifera	30	38	207,689.0	2,629.0	8.5	76.9
9.	Pleuronectidae, j uv.	28	35	8,660.5	109.6	004	77.3
10.	Agonidae	28	35	3,787.6	48.0	0.2	77.4
110	Natica clausa	25	32	924.8	11.7	<0.1	77.5
12.	Hippoglossoides elassodon	24	30	15,842.3	200.5	0.7	78.1
13.	Echinarachnius parma	23	29	11,306.6	143.1	0.5	78.6
14.	leuronectes quadritubercul atus	22	28	30,967.1	392.0	1.3	79.9
15.	Phaeophyta (drift?)	21	27	6,983.5	88.4	0.3	80.2
16.	Gadus macrocephalus	20	25	78,211.0	99000	3.2	83.4
17.	Theragra chalcogramma	18	23	7,194.7	91.1	0.3	83.7
18.	Ammodytes hexapterus	16	20	1,847.7	23.4	0.1	83.7
19.	Hippoglossus stenolepis	15	19	7,589.7	96.1	0.3	84.0
20.	Porifera	14	18	8,648.5	109.5	0.4	84.4
21.	Chionoecetes bairdi	14	18	3,104.4	39.3	0.1	84.5
22.	Cancer oregonensis	14	18	1,892.9	24.0	0.1	84.6
23.	Potamilla reniformis	12	15	164,662.0	2,084.3	6.6	91.3
24.	Liparis sp.	11	14	371.6	4.7	<0.1	91.4
25.	Microgadus proximus	10	13	5,750.2	72.8	0.2	91.6
26.	Ophiuroidea	10	13	2,809.9	35.6	0.1	91.7
27.	Ectoprocta	10	13	1,538.1	19.5	0*1	91.8

sampled; these were: Limanda aspera, Lepidopsetta bilineata, Asterias amurensis, Boltenia ovifera (tunicate) and Potamilla reniformis (marine worm), in descending order by weight. The combined biomass of these five species equalled 73 percent of the total biomass sampled.

The results of cluster analysis on abundance data (weights) are presented in separate site and species dendrograms as well as a two-way site by species matrix. Sites were clustered into two widely distributed groups (IA and IB) and a localized group (II) (Figure 6.3-1). The spatial distribution of the major site groups is shown in Figure 6.3-2. These site groups overlap considerably. Such overlap is attributed to a combination of the patchy nature of the substrate and the sampling procedures. The substrate in the study area included sand, gravel, boulders and large rocky outcropping. Epifaunal samples involved 10 minute trawls which covered a large area, thereby increasing the chances of sampling more than one habitat. In spite of this problem, some basic patterns were evident (Table 6.3-2). Group IA occurred more extensively in the Unimak and Izembek areas, while group IB was more extensive in the Black Hills and Port Moller areas. Group IB also occurred in areas closer inshore where the two groups were contiguous. The mean sample depths were 43 m (group IA) and 37.5 m (group IB).

The species used in cluster analysis fell into two major species groups (Figure 6.3-3). Group A contains 12 taxa, many of which are characteristic of soft sediments. Species group B contains 23 taxa, many of which, especially those in group B2, are characteristic of hard substrates. Many of the most frequently caught taxa, and all five of the taxa that dominated trawl samples by weight, are in group B.

The site by species matrix (Figure 6.3-4) shows the abundance distribution of species within samples. Species group B1 contains the most ubiquitous species and are found in all site groups. Site group IA is composed primarily of soft-bottom organisms in species group B1. Site group IB is also composed of soft-bottom organisms in species group B1 and hard-bottom organisms in species group B2.

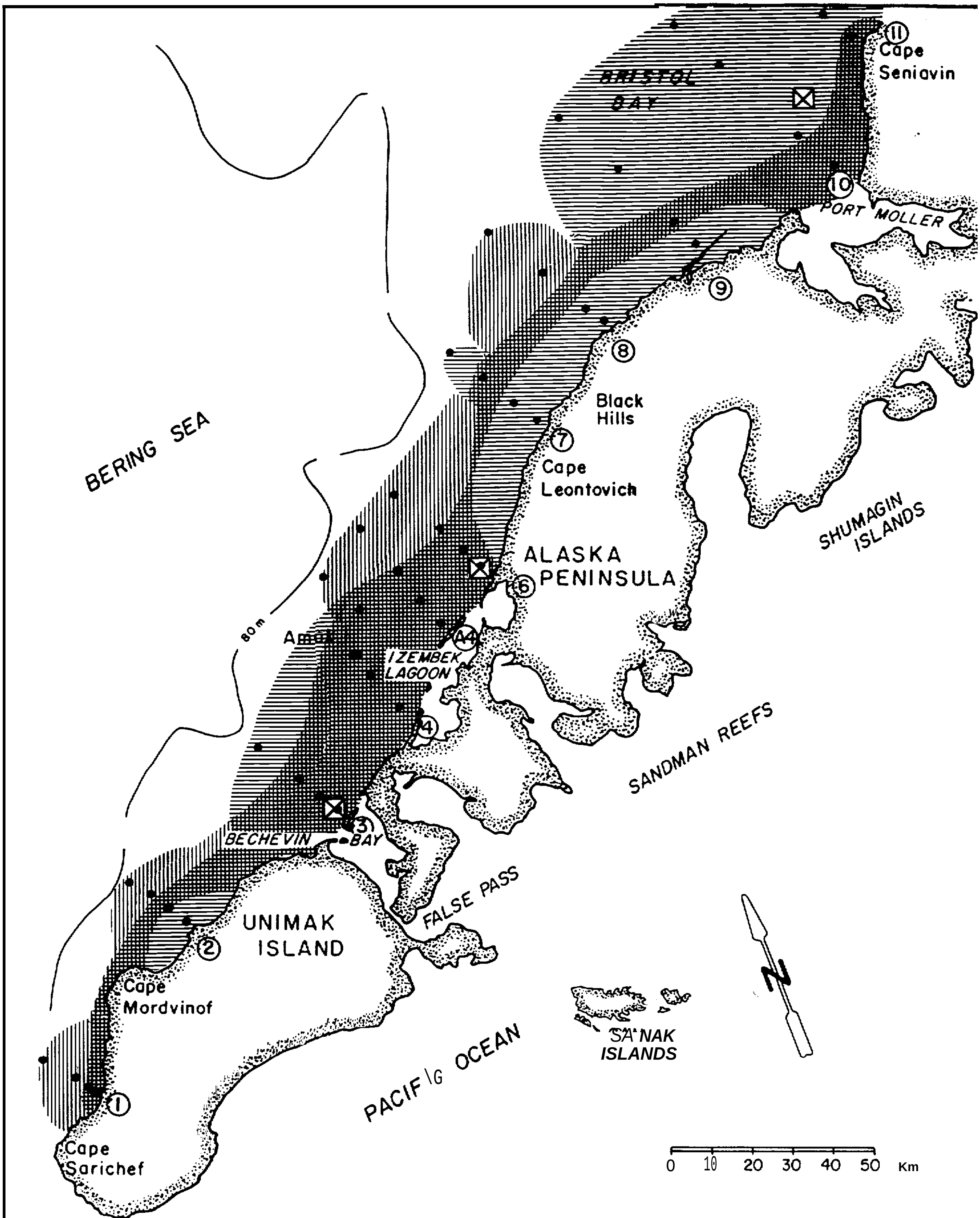


NORTH ALEUTIAN F

SITE DENDROGRAM FROM EPIFAUNAL SAMPLES

1982-1983 FIGURE 6.3-

SITE IDENTIFIERS = DATE/TRANSECT/DEPTH(m)/REPLICATE



• = STATION

= SITE GROUP IA - SOFT-BOTTOM ORGANISMS

= TRANSECT

= SITE GROUP IB - HARD-BOTTOM ORGANISMS

= SITE GROUP II

NORTH ALEUTIAN SHELF

SPATIAL DISTRIBUTION OF MAJOR EPIFAUNAL SITE GROUPS

1982-1983

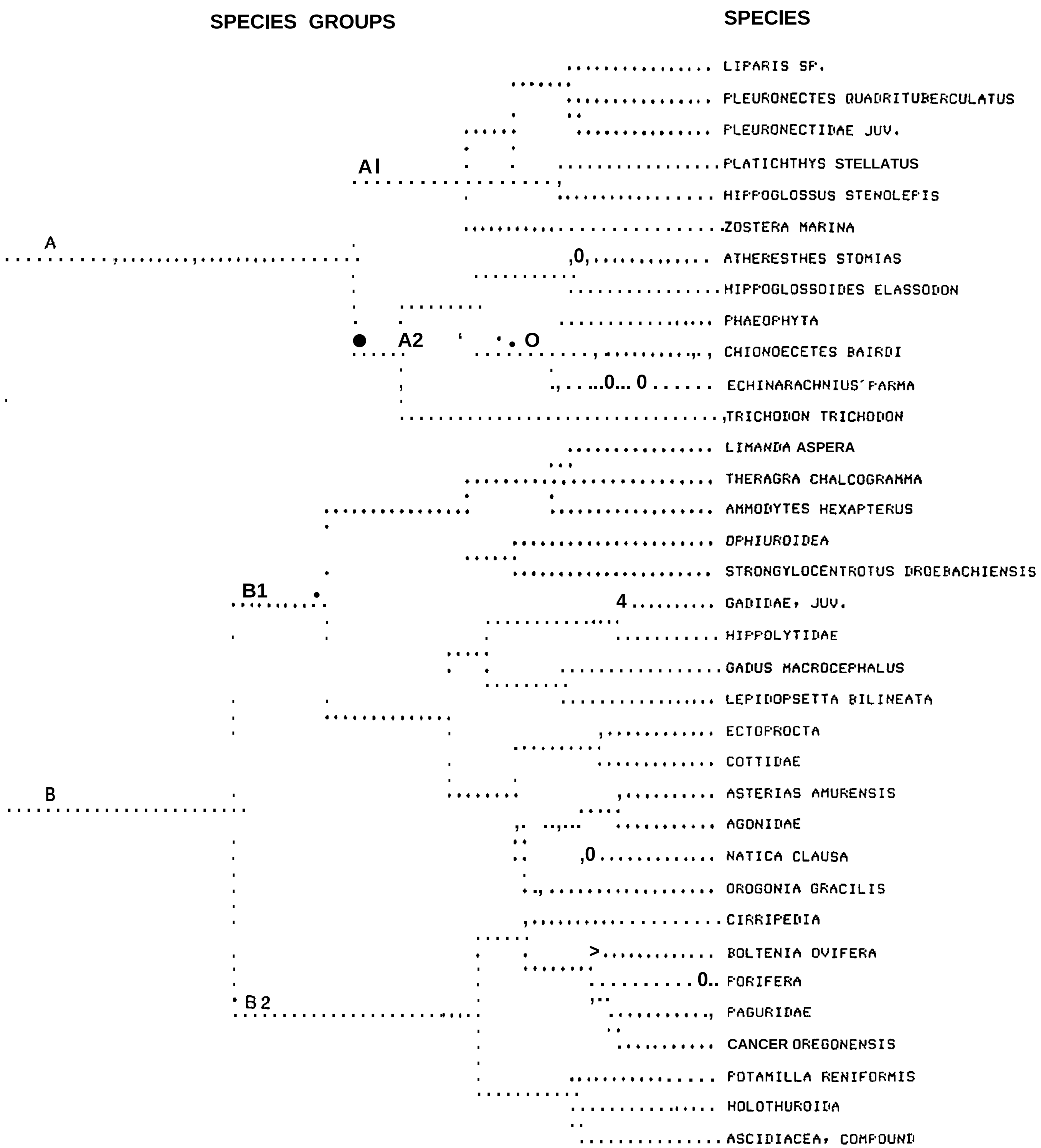
FIGURE 6.3-2

TABLE 6.3-2

SITE GROUP CHARACTERISTICS FOR EPIFAUNA DATA

Site Group	Number of Samples	Bottom Depth(m) Mean	Bottom Depth(m) Range	Number of Samples Per Month Jun	Aug	Ott	Number of Samples Per Transect(a) 1	2	3	4	67	8	9	10	11
I	70	41	10-65	15	29	26	7	8	8	13	865		7	4	4
IA	39	43	15-60	9	21	8	75		69		612		1	1	1
IA1	35	43	20-60	7	19	8	6	2	6	9	612		1	1	1
IA2	4	46	15-60	2	2	0	1	3	0	0	000		0	0	0
IB	31	37.5	10-60	6	7	18	0	3	2	4	2 5	3	6	3	3
IB1	16	38	10-60	6	5	5	03		0	1	132		3	1	2
IB2	15	37	10-60	0	2	13	0	0	2	3	121		3	2	1
II	4	19	10-30	2	0	2	00		1	0	200		0	1	0
Total I + II	74			17	29	28	7	8	9	1 3	1 0	6	5	7 5	4

(a) Transects 1,2 = Unimak area
Transects 3,4 = Izembek area
Transects 6,7,8 = Black Hills area
Transects 9, 10, 11 = Port Moller area



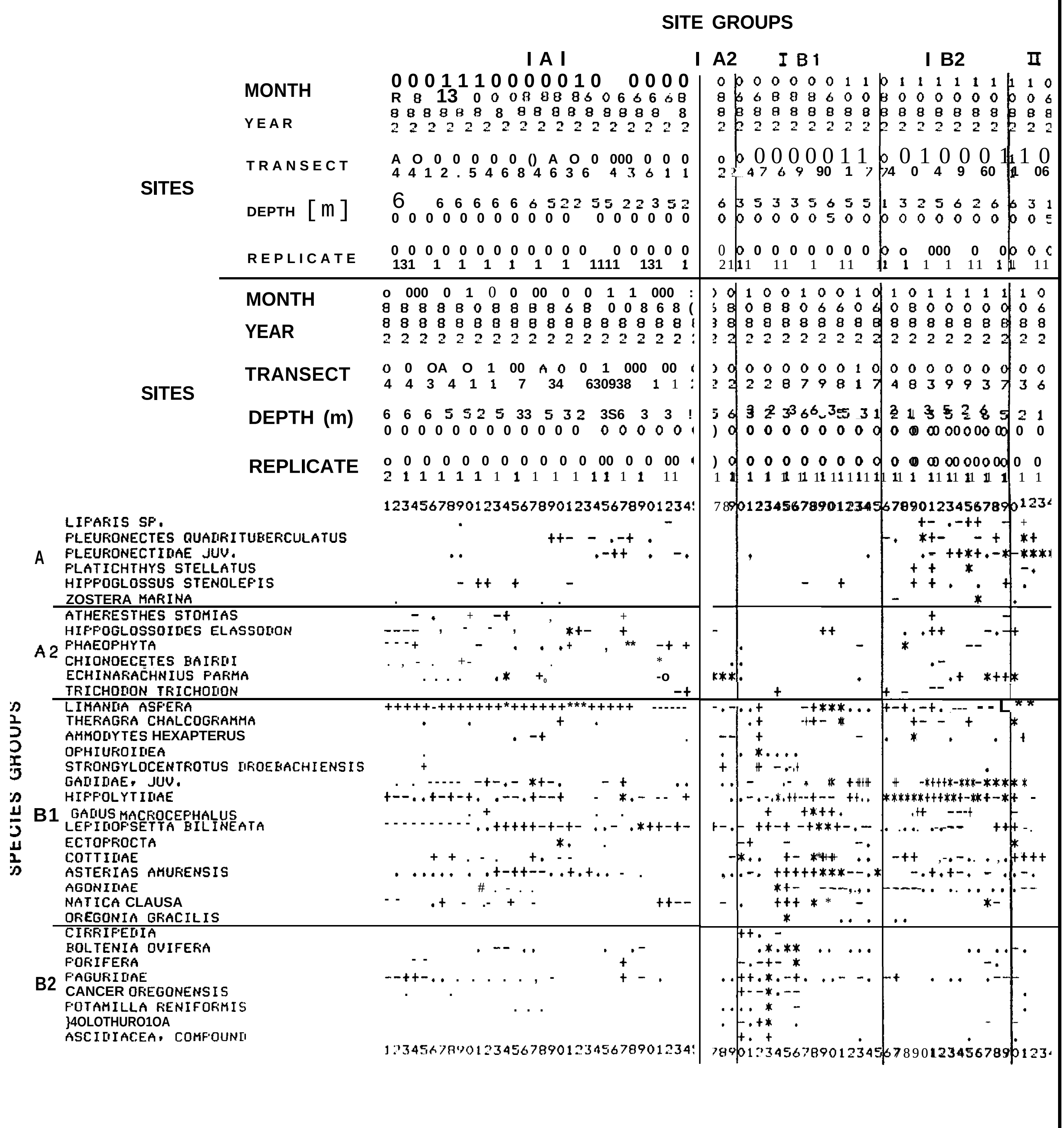
NORTH ALEUTIAN SHELF

SPECIES DENDROGRAM FROM EPIFAUNAL SAMPLES

vtn

1982-1983

FIGURE 6.3-3



ABUNDANCE VALUES :

- • = $(\sqrt{x}/\sqrt{\bar{x}}) \leq 0.5$
- \- = $(\sqrt{x}/\sqrt{\bar{x}}) > 0.5 \leq 1.0$
- \+ = $(\sqrt{x}/\sqrt{\bar{x}}) > 1.0 \leq 2.0$
- * = $(\sqrt{x}/\sqrt{\bar{x}}) > 2.0$

NORTH ALEUTIAN SHELF

TWO-WAY SITE AND SPECIES MATRIX FROM EPIFAUNAL SAMPLES

1982-1983 | FIGURE 6.3-4

The species characteristic of the five site groups are listed in Table 6.3-3. These species were the most abundant (biomass) and together represented 90 percent of the total biomass within each sample group. Site groups IA1 and IA2 were dominated by the flatfishes Limanda aspera and Lepidopsetta bilineata (Figure 6.3-5), which together represented 65 to 80 percent of the biomass of these samples. Group IA1 was further characterized by much smaller amounts of the seastar Asterias amurensis, the tunicate Boltenia ovifera and the flatfish Pleuronectes quadrituberculatus. Group IA2 was further characterized by the sand dollar Echinarachnius parma and an unidentified fish species.

Greater numbers of taxa characterized groups IB1 and IB2, as shown in Table 6.3-3. While the flatfishes L. aspera and L. bilineata were important in these groups, they did not dominate the total biomass as in group IA samples. The group IB1 species assemblage was dominated by invertebrates: the seastar A. amurensis, the tunicate B. ovifera, the colonial, reef-building polychaete worm Potamilla reniformis and pagurids (hermit crab) (Figure 6.3-6). This species assemblage was found primarily in samples from the area between Izembek Lagoon and Port Moller (Figure 6.3-7). Stations of the central coast of Unimak Island were also characterized by this species assemblage.

Group IB2 samples were dominated by the flatfish-sea star group characteristic of group IA, but also had a number of other taxa represented. Drift eelgrass, Zostera marina, was an important component of this group, as were juvenile and adult codfishes (Gadidae), other flatfishes, including starry flounder (Platichthyes stellatus) and Alaska plaice (P. quadrituberculatus), and Hippolytid shrimp. This species assemblage was not represented in June samples and was found only in the area between Bechevin Bay and Port Moller (Figure 6.3-7).

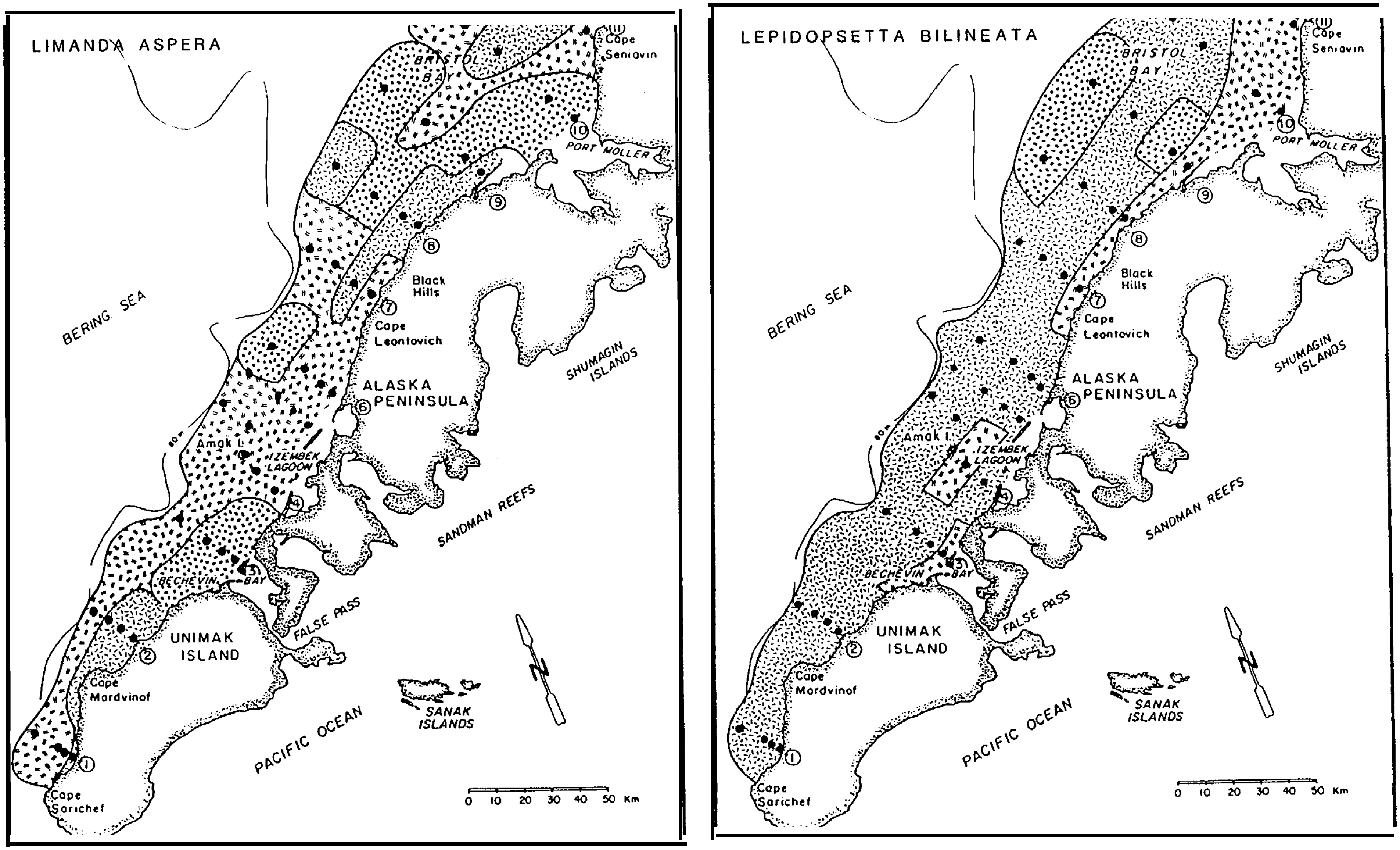
The four samples in group 11 were characterized by the highest mean biomass of L. aspera and the presence of juvenile flatfishes (Pleuronectidae). These samples were found only in shallow areas off Bechevin

TABLE 6.3-3

CHARACTERISTIC TAXA OF SITE GROUPS[a]

		Taxon	Frequency of Occurrence	Mean Weight(g)	Percent of Total Weight	Cumulative Percent
GROUP IA1						
No. of Samples = 35	1.	Limanda aspera	100.0	12,344	56.5	56.5
No. of Species = 59	2.	Lepidopsetta bilineata	94.3	5,137	23.5	80.1
	3.	Asterias amurensis	65.7	1,660	7.6	87.7
	4.	Boltenia ovifera	22.9	331	1.5	89.2
	5.	Pleuronectes quadrituberculatus	28.6	326	1.5	90.7
GROUP 1A2						
No. of Samples = 4	1.	Lepidopsetta bilineata	100.0	5,425	43.6	43.6
No. of Species = 23	2.	Limanda aspera	100.0	2,723	21.9	65.5
	3.	Echinarachnius parma	100.0	2,020	16.2	81.7
	4.	Osteichthyes	25.0	1,702	13.7	95.4
GROUP IB1						
No. of Samples = 16	1.	Asterias amurensis	93.8	15,388	24.1	24.1
No. of Species = 60	2.	Boltenia ovifera	68.8	11,300	17.7	41.8
	3.	Potamilla reniformis	25.0	10,211	16.0	57.8
	4.	Lepidopsetta bilineata	81.3	8,162	12.8	70.6
	5.	Limanda aspera	68.8	7,290	11.4	82.0
	6.	Gadus macrocephalus	37.5	2,996	4.7	86.7
	7.	Cirripedia	25.0	1,438	2.3	89.0
	8.	Zooantharia actiniaria	25.0	1,311	2.1	91.1
GROUP 1B2						
No. of Samples = 15	1.	Limanda aspera	86.7	4,005	23.5	23.5
No. of Species = 51	2.	Lepidopsetta bilineata	66.7	2,773	16.3	39.8
	3.	Asterias amurensis	66.7	1,473	8.7	48.5
	4.	Zostera marina	20.0	1,419	8.3	56.8
	5.	Gadidae, juvenile	80.0	1,294	7.6	64.4
	6.	Platichthys stellatus	20.0	1,233	7.2	71.6
	7.	Gadus macrocephalus	40.0	1,111	6.5	78.2
	8.	Pleuronectes quadrituberculatus	46.7	615	3.6	81.8
	9.	Hippolytidae	100.0	552	3.2	85.0
	10.	Boltenia ovifera	40.0	449	2.6	87.6
	11.	Cottidae	60.0	397	2.3	90.0
GROUP 11						
No. of Samples = 4	1.	Limanda aspera	50.0	18,536	66.7	66.7
No. of Species = 23	2.	Pleuronectidae, juvenile	100.0	1,697	6.1	72.8
	3.	Pleuronectes quadrituberculatus	50.0	1,619	5.8	78.7
	4.	Zooantheria actiniaria	25.0	1,375	5.0	83.6
	5.	Cottidae	75.0	1,360	4.9	88.5
	6.	Asterias amurensis	50.0	1,120	4.0	92.5

(a) Taxa comprising 90% of total group biomass are ranked by weight.



• = STATION
\# = TRANSECT

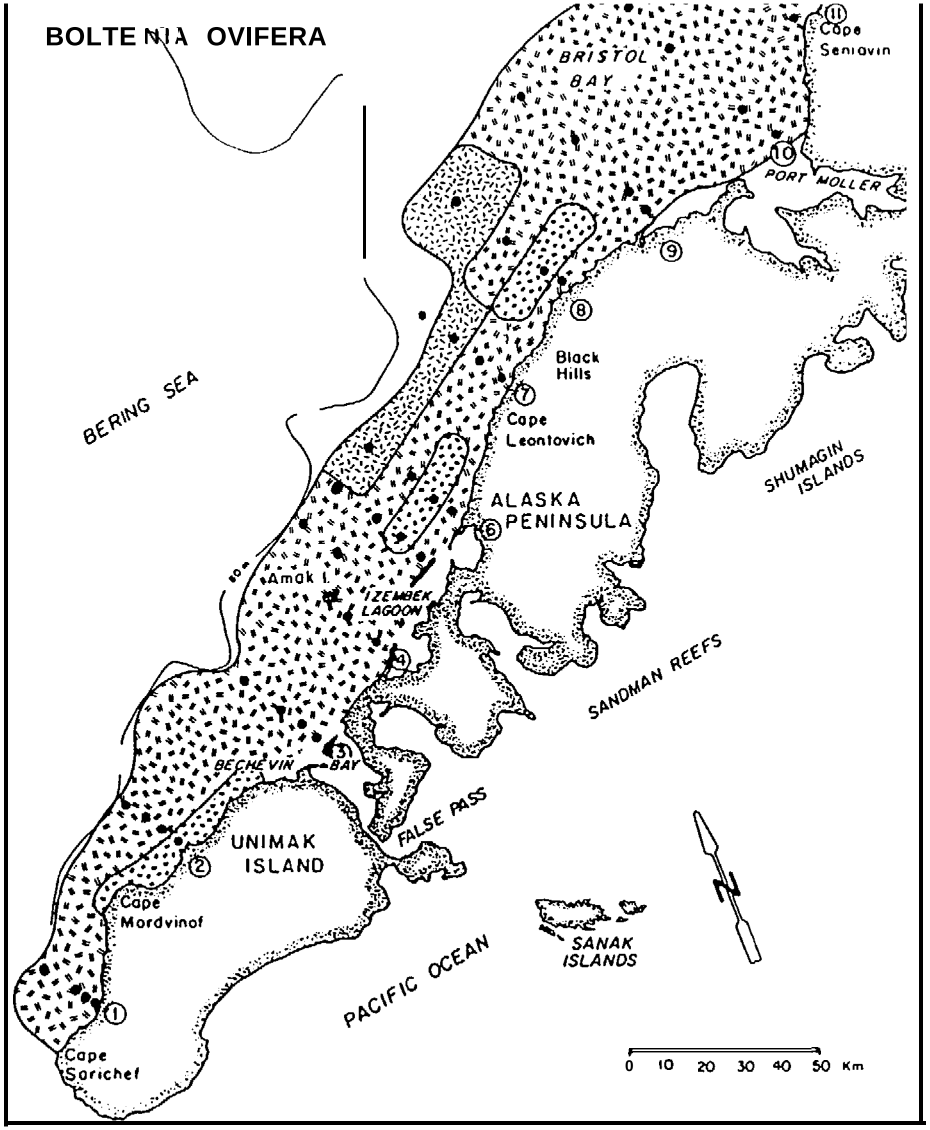
ABUNDANCE

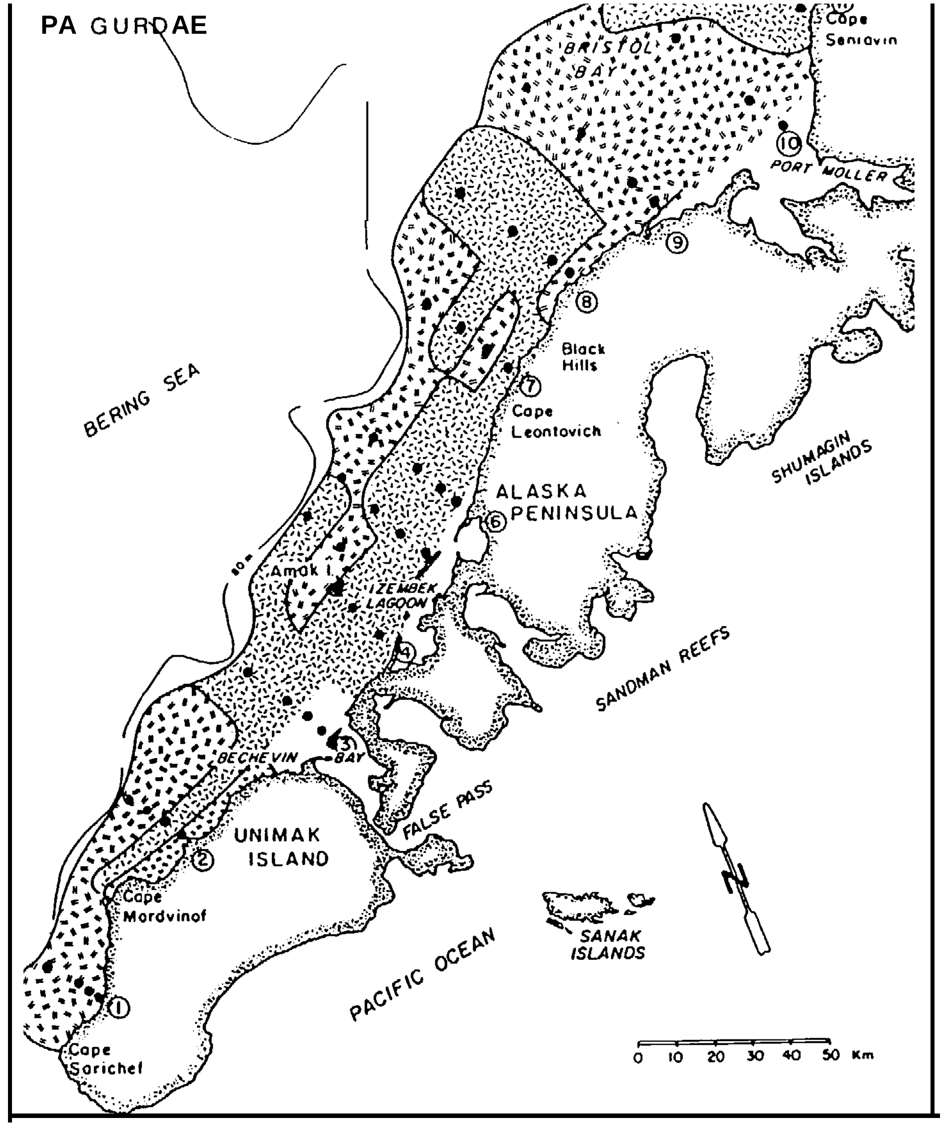
= HIGH ($\sqrt{x} / \sqrt{\bar{x}}$) > 2.0
= MEDIU ($\sqrt{x} / \sqrt{\bar{x}}$) ≤ 1.0
= LOW ($\sqrt{x} / \sqrt{\bar{x}}$) ≤ 0.5

.. ALEUTIAN SHELF

SPATIAL DISTRIBUTION OF SELECTED SOFT-BOTTOM EPIFAUNAL SPECIES.

1982-1983 FIGURE 6.3-5





ABUNDANCE

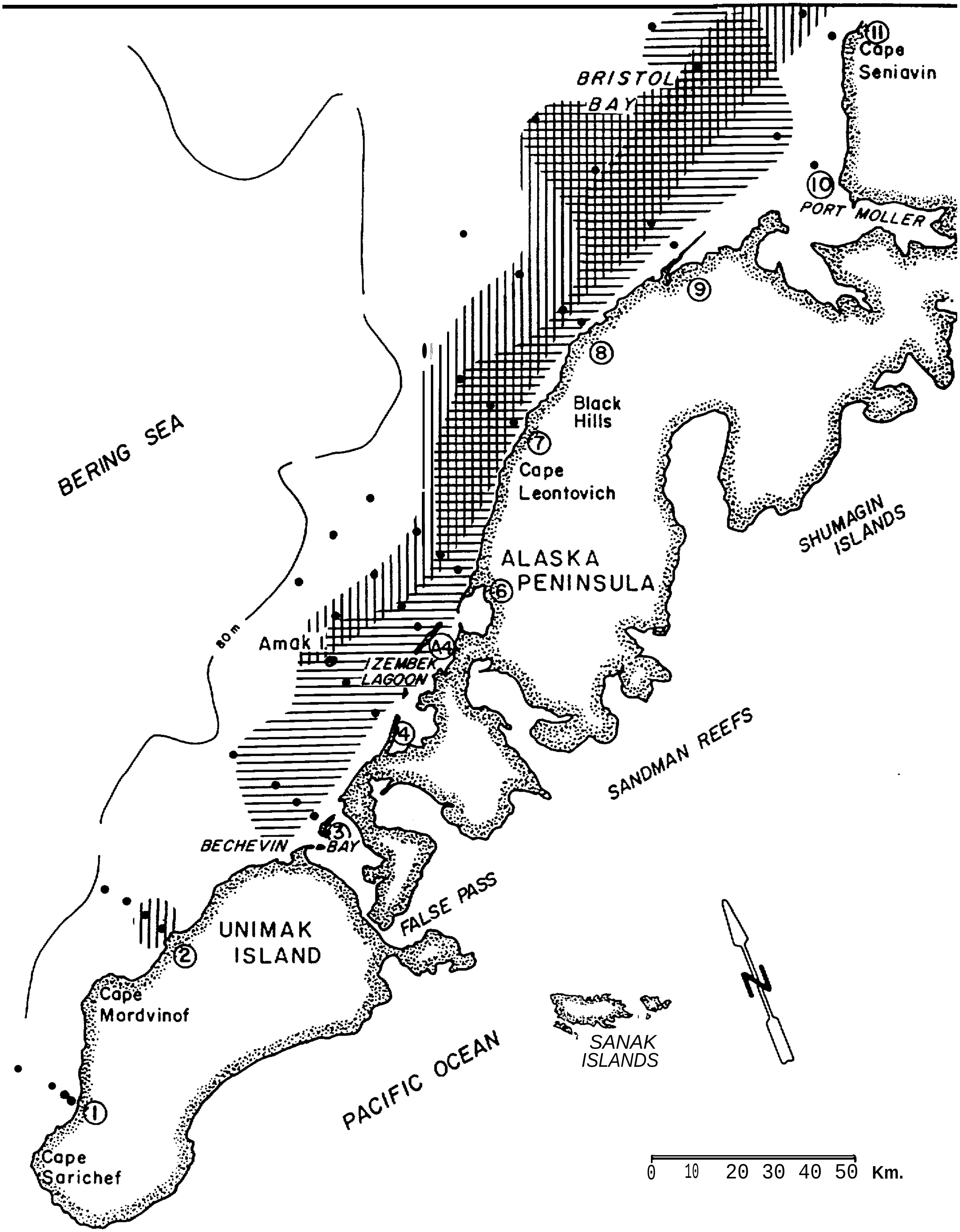
● = STATION
(#) = TRANSECT

= HIGH $(\sqrt{x} / \sqrt{\bar{x}}) > 2.0$
= MEDIUM $(\sqrt{x} / \sqrt{\bar{x}}) \leq 1.0$
: LOW $(\sqrt{x} / \sqrt{\bar{x}}) \leq 0.5$

NORTH ALEUTIAN SHELF

SPATIAL DISTRIBUTION OF SELECTED HARD-BOTTOM EPIFAUNAL SPECIES.

vtn 982-1983 FIGURE 6.3-



• † STATION

(#) = TRANSECT

|||| = SITE GRWP I B1- YELLOW FIN & ROCK SOLE, SEA STARS, SCULPINS, HARD-BOTTOM INVERTEBRATES

☰ = SITE GROUP 1B2 - JUVENILE COD & FLATFISH, SNAILFISH, SHRIMP

NORTH ALEUTIAN SHELF

SPATIAL DISTRIBUTION OF MINOR EPIFAUNAL SITE GROUPS

1982-1983

FIGURE 6.3-7

Bay, Izembek Lagoon and Port Moller. The other small (distribution) sample group, IA2, was characterized by *Echinarachnius parma* (sand dollar) and was abundant in the Cape Mordvinof area.

Previous epifauna studies of the nearshore area between Unimak Island and Port Moller are limited to a small number of stations sampled during studies of the central Bering Sea (Feder and Jewett 1980; Pereyra et al. 1976). The nearshore region of the North Aleutian Shelf (NAS), is generally considered to be more productive than deeper offshore areas of the eastern Bering Sea in terms of infuana and invertebrate epifauna biomass (Armstrong et al . 1982). Biomass values from trawls in the present and previous studies of the NAS are dominated by demersal fish, although invertebrates appear to be more important in the shallower areas associated with more rocky substrates. Trawl samples from Bristol Bay (NMFS Bering Sea subarea 1) during 1975-1976 were composed of 70 percent fish by weight (Pereyra et al. 1976), whereas trawl samples in the present study were 59 percent fish. This difference may be attributed to the type of trawl used. The 1975 studies utilized large otter trawls, which usually capture larger fish than the trynet used in this study . The relative abundance of the fish families from these two studies are presented in Table 6.3-4. Pleuronectids represented about 85 percent of the fish caught in both studies. The average biomass of fish caught per area in nearshore samples during this study was about one half the biomass reported for all of Bristol Bay.

The relative importances of invertebrate groups sampled during three studies are presented in Table 6.3-5. Crabs dominated the invertebrate epifauna sampled in 1975, representing -50 to 58 percent of the invertebrate biomass, followed by echinoderms at 22 to 29 percent. The 1982 sample biomass was dominated by echinoderms (primarily *Asterias amurensis*) at 48 percent and ascidians (primarily *Boltenia ovifera*) at 26 percent. Crustaceans represented only 3.4 percent of invertebrate biomass from 1982 nearshore samples. The mean invertebrate biomass per unit area for 1982 nearshore samples was about two-thirds the inverte-

TABLE 6.3-4

RELATIVE IMPORTANCE OF FISH FAMILIES
FROM SOUTHEASTERN BERING SEA STUDIES

Family	Percent of Total Fish Catch By Weight 1975[(a)]	1982[(b)]
Gadidae	7.7	8.1
Pleuronectidae	85.0	85.2
Cottidae	4.0	0.3
Zoarcidae	0.3	<0.1
Rajidae	<0.1	2.4
Agonidae	0.3	0.3
Other fish	2.4	3.7
Mean biomass per area (g/m^2)	9.121	4.297

(a) samples from NMFS subarea 1 (Bristol Bay) (Pereyra et al. 1976)

(b) This study

TABLE 6.3-5

RELATIVE IMPORTANCE OF INVERTEBRATE
GROUPS FROM SOUTHEASTERN BERING SEA STUDIES

Taxa	Percent of Total Invertebrate Catch 1975(a)	1975(b)	1982(c)
Porifera	1.1	14.1	1.2
Coelenterata	3.9	1.7	0.1
Mollusca	6.5	3.4	0.6
Crustacea	58.0	50.3	3.4
Paralithodes camtschatica	21.1	29.5	<0.1
hionoecetes opilio	19*9	18.8	0.1
C bairdi	10.8		0.3
Echinodermata	22.0	29.2	48.2
Asteroidea		9.1	
Asterias amurensis	17.9		46.3
Echinoidea		5.4	0.5
Ophiuroidea		0.3	
Holothuroidea		0.1	
Ascidacea	8.5	1.3	25.9
Annelida (Polychaeta)	<0.1		20.1
Mean invertebrate biomass per area (g/m^2)	3.338	3.874	2.493

(a) Samples from <80 m on the middle shelf and coastal areas (Feder and Jewett 1980)

(b) Samples from NMFS Subarea 1 (Bristol Bay) (Pereyra et al. 1976)

(c) This study

brate biomass during 1975 reported for Bristol Bay. Crustacean biomass from 1982 trawls averaged 0.085 g/m^2, compared to 1.936 g/m^2 and 1.949 g/m2 from 1975 trawls (Feder and Jewett 1980; Pereyra, et al. 1976, respectively) . Echinoderm biomass was higher during 1982 (1.202 g/m^2 compared to 0.734 g/m^2 and 1.131 g/m^2 for 1976), as was ascidian biomass (O .646 g/m^2 compared to 0.284 g/m^2 and 0.050 g/m^2 for 1976). Pol ychaete biomass from 1982 samples averaged 0.501 g/m^2 compared to <0.334 g/m^2 during 1976 (Feder and Jewett 1980).

Based on the limited number of comparable studies, total epifaunal biomass per unit area in the nearshore Unimak Island to Port Moller region appears to be less than epifaunal biomass per unit area for the middle shelf and coastal domains of the southeastern Bering Sea. The biomass of certain invertebrate taxa, primarily echinoderms, ascidians and colonial, reef-building polychaetes, however, appears to be greater per unit area in the nearshore region.

6.4 Sea Otters

Results from aerial sea otter surveys are presented in Appendix F. Analyses indicate that sea otter abundance had significant ($p<.05$) seasonal and spatial variability (Table 6.4-1). Spatial variability occurred alongshore, offshore and with depth; these three factors also had interacting components. Trends regarding sea otter abundance with each physical variable will be presented, followed by a discussion of the dynamics of all variables and possible causal factors driving this system.

Data were analyzed in two manners. First, totals from individual transects surveyed in this and Schneider’s study (1976) were analyzed to determine seasonal and long-term fluctuations. Results of ANOVA indicate significant variability ($p<.05$) with time (Table 6.4-l). During 1982-83, sea otters were significantly more abundant ($p<.05$) in August (10 ,325) than either March (1,454), June (1,880) or October

TABLE 6.4-1

VARIABILITY OF THE SEA OTTER POPULATIONS

A. Seasonal Comparisons, using densities per transect

1. ANOVA

Variable	Degrees Freedom	p(a)
Date	3	$p < .0125$

2. Duncan Multiple Range Test(b)

Season	Total
July 1975	17,365a
August 1982	10,325a
October 1982	4,737b
June 1982	1,880b
March 1983	1,454b

B. Spatial Comparisons, using ranked abundances per quadrat

1. ANOVA

Variable	Degrees Freedom	p(a)
Area	3	$p < .0001$
Depth	2	$p < .0001$
Season	3	$p < .0010$

2. Duncan Multiple Range Test(b)

Area	Aerial Transects	June 1982 0-20 (m)	June 1982 21-40 (m)	June 1982 41-60 (m)	August 1982 0-20 (m)	August 1982 21-40 (m)	August 1982 41-60 (m)
Unimak	1-15	1490cde	1251ff	1196ef	1386de	1522cd	1221ef
Izembek	16-30	1351def	1280def	1239ef	1733ab	1362ef	1208f
Black Hills	31-35	1522bcd	1235ef	1156f	1273def	1156ef	1183f
Port Moller	39-43	1250ef	1274def		1380de	1217ef	

Area	Aerial Transects	October 1982 0-20 (m)	October 1982 21-40 (m)	October 1982 41-60 (m)	March 1983 0-20 (m)	March 1983 21-40 (m)	March 1983 41-60 (m)
Unimak	1-15	1622bc	1424ff	1221ef	1352def	1203ef	1221ef
Izembek	16-30	1616bc	1460cde	1253ef	1333def	1249ef	1233ef
Black Hills	31-35	1329def	1315def	183 f	1335def	1399cde	1212ef
Port Moller	39-43	1391de	1226ef		1262def	1286def	

(a) Significance of variable(s)

(b) Significance among cells

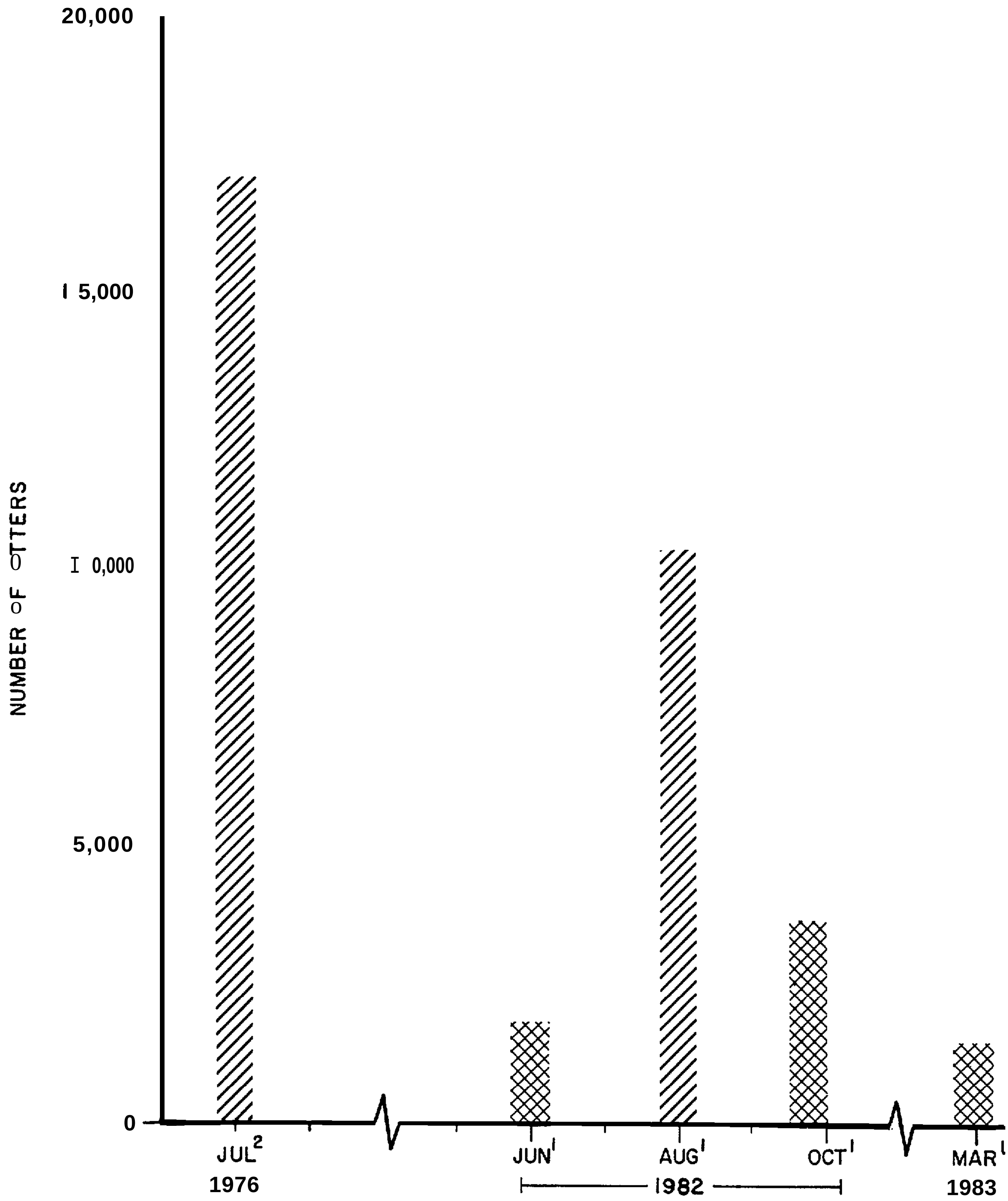
a,b,c,etc. = Values with same letter(s) are not significantly different ($p<.05$)

(4,737), which were not significantly different $(p<.05)$ from each other (Figure 6.4-l). Sumner values (July 1976) collected by Schneider (1976) were greater but not significantly different $(p<.05)$ from August 1982 levels. These results indicate two different seasons, a summer period of high abundance (July-August or September) with over seven times as many sea otters as during the winter (October-June). Additional data in the area from Schneider (1976), not conducted along the transects, also indicates a large (12x) increase in the population during summer months.

Data were also analyzed by dividing the transects into contiguous quadrats, each one measuring two miles long by a tenth mile wide. Density values per quadrat were transformed into rankings. ANOVA analyses indicates significant variability $(p<.05)$ with depth, area and season (Table 6.4-1). Abundance values were highest nearshore in waters between 0-20 m deep. Abundance values in each depth interval were highest in August, indicating all depths underwent changes in seasonal usage. Schneider (1976, 1981) also indicated in his figures that abundance was greatest closer to shore. Alongshore variability in otter abundance was also significant $(p<.05)$. Otters were more abundant in the Unimak and Izembek areas than in the Black Hills-Port Moller area. These results are consistent with Schneider (1976).

The three factors of season, depth (or offshore location] and alongshore variability have strong interactive components. Ranked abundance values per area were plotted for all four seasons (Figure 6 .4-2). By looking at the abundance values per area and total abundance for the whole study site, the interrelationship among variables can be better understood and the demographic dynamics of the population can be developed.

Between March and June the total population size did not change significantly $(p<.05)$, but some net movement occurred from deeper to shallower areas off Black Hills. Between June and August the largest net influx of animals occurred into the study area. The largest increase occurred in the Unimak and Izembek areas and into the Port Moller area.



1 = THIS STUDY

2 = SCHNEIDER 1976

SAME PATTERNS: NOT SIGNIFICANTLY DIFFERENT ($p<.05$)

DIFFERENT PATTERNS = SIGNIFICANTLY DIFFERENT ($p<.05$)

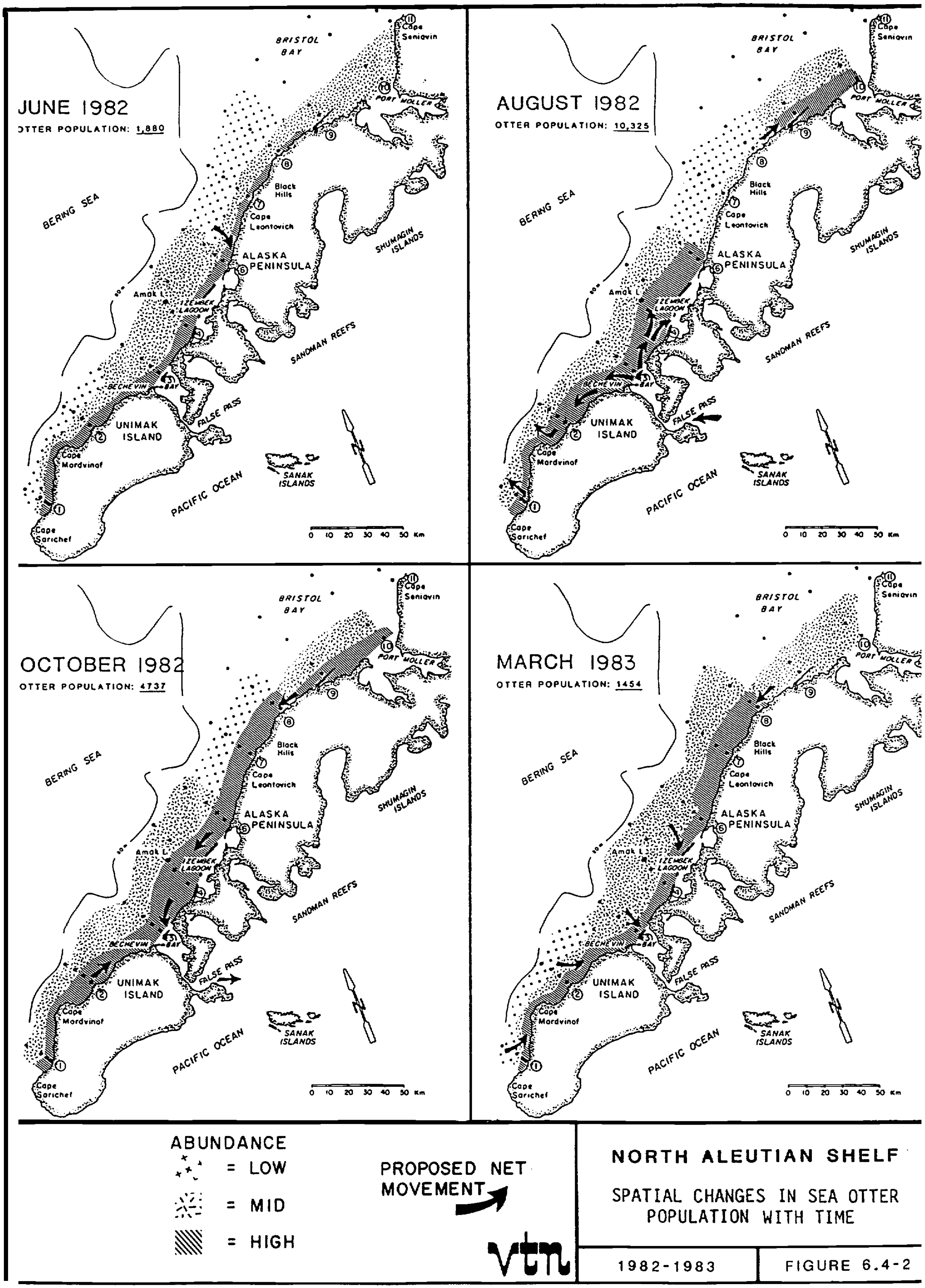
vtn

NORTH ALEUTIAN SHELF

SEASONAL CHANGES IN
SEA OTTER POPULATION

1982-1983

FIGURE 6.4-1



NORTH ALEUTIAN SHELF

SPATIAL CHANGES IN SEA OTTER POPULATION WITH TIME

1982-1983

FIGURE 6.4-2

The animals were most likely migrating from Bechevin Bay via False Pass from populations in the Pacific. Lensink (1958) also suggested that the population might undergo seasonal migrations. Such migration is possible since: the route traveled is shallow, allowing continuous feeding as apparently is necessary; the area of highest concentration was in the Bechevin Bay-Izembek Lagoon area where the otters would first enter the area; and observations of large numbers of otters have been made in and around False Pass (John Sarvis, USFWS, Personal Communication).

Migration from further east is unlikely since ice limits the eastern distribution of the animals (Schneider 1976), and/or from further west, either through or across Unimak Pass, is possible but unlikely since otters usually do not migrate along or across deep trenches where they are unable to feed (Kenyon 1969). Sea otters in California also undergo seasonal migrations (Estes and Jameson1983). In addition, animals released at distances 72 km from their home site returned, often to the same kelp bed (Wild and Ames 1974). These seasonal movements may be related to migration patterns of bottom fish and shellfish (see Section 6.5).

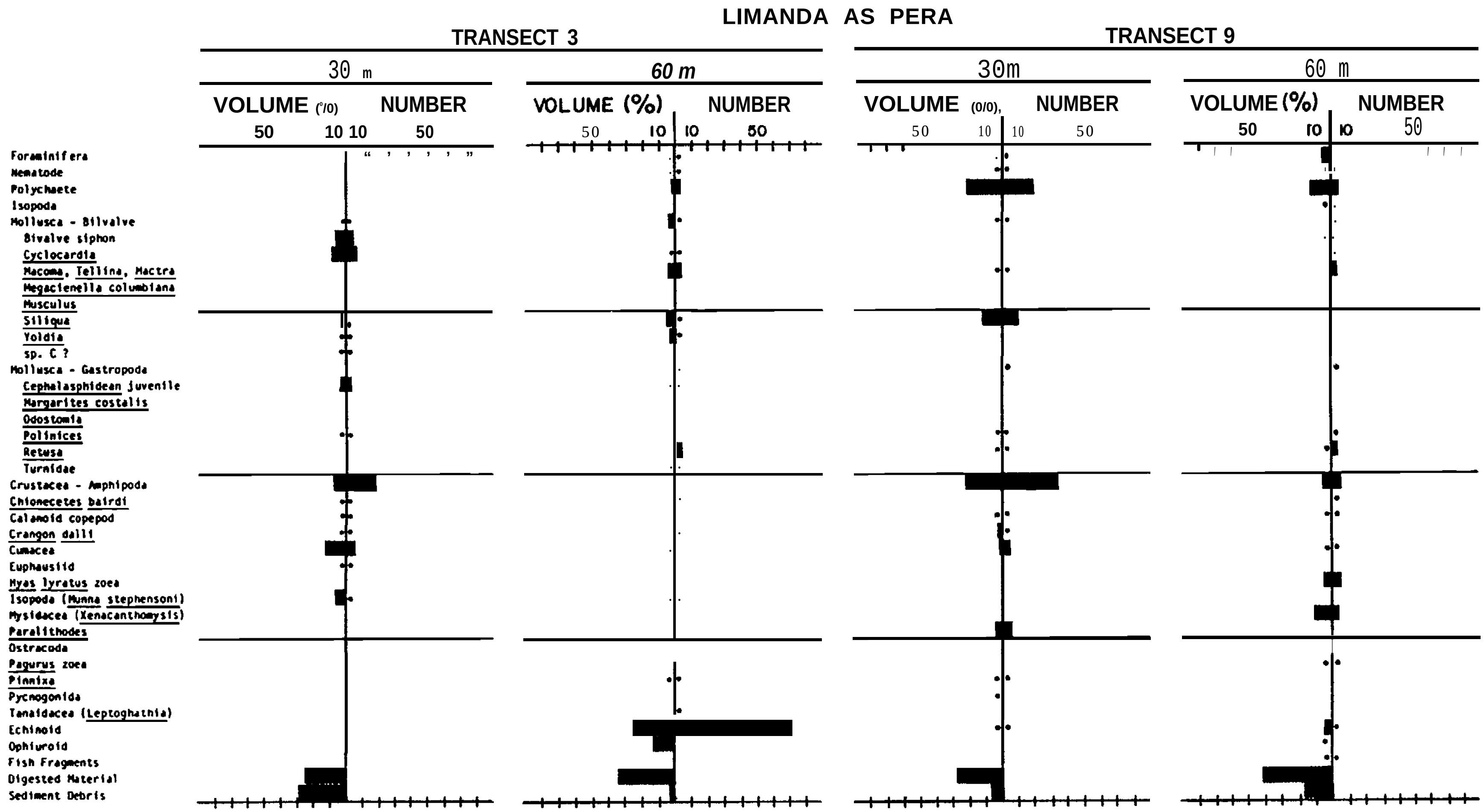
Between August and October the sea otter population decreased significantly ($p<.05$) to near its winter minimum. Net movement occurred from areas deeper and areas removed from Bechevin Bay. Between October and March, the otter population decreased slightly with animals in deeper waters and in areas removed from Bechevin Bay moving back toward this area.

Comparisons between summer surveys conducted in 1976 (Schneider 1976) and this study indicate no significant differences ($p<.05$) (Figure 6.4-l), suggesting that the summer population has been stable between these years. The stability of the population was maintained in spite of the movement of ice into the study area during the winter and spring of 1982 when many sea otters were observed surrounded by or walking on the ice (John Sarvis, USFWS, Personal Communication). Ice is not likely to regulate the summer population. The impact of ice would most likely occur during the winter and early spring when only 10 percent of the summer population is present. Ice probably only effects the distribution and abundance of the winter population on its eastern edge. Ice apparently prevents sea otters from feeding by covering their foraging areas. The otters seek refuge on the ice (Schneider and Faro 1975) or on land where they have been seen walking many miles from the coast (John Sarvis, USFWS, Personal Communication). The number of carcasses noted on the beaches in the late spring of 1982 after the ice retreated did not appear to vary from previous non-ice years (John Sarvis, USFWS, Personal Communication).

Ice could be an important factor if the winter population, as suggested for southern California populations, is composed primarily of pregnant females (Mike Bonnell, UCSC, Personal Communication). Mothers and pups have been observed in the study area, but their relative abundance in the winter is not known.

6.5 Trophic Interactions

Flatfish Feeding Habits. Feeding habits were examined for the two dominant fish species, *Limanda aspera* and *Lepidopsetta bilineata*, in high and low density sea otter areas during August. Results for yellowfin sole (*L. aspera*) are summarized in Figure 6.5-1 and reveal several trends. *L. aspera* taken at shallow stations were smaller than those from deeper stations. The ages of these fish were estimated from published age-length data (Bakkala 1981; Pereyra, et al. 1976). Fish collected at 30 m along both transects averaged three to four years, while the fish from 60 m averaged five to six years on transect 3, and eight to 10 years on transect 9. Smaller fish ate fewer prey taxa (16 and 17), than the larger fish (21).



	Transect 3, 30 m	Transect 3, 60 m	Transect 9, 30 m	Transect 9, 60 m
NUMBER OF SAMPLES	10	10	10	10
FISH SIZE, $\bar{X}$ (mm)	1%.6	192.0	141.3	258.7
FISH SIZE, RANGE (mm)	90-199	118-23s	68-180	204.119
NUMBER OF PREY TAXA	16	21	17	21
FULLNESS, $\bar{x}$	2.2	2.5	3.1	2.1
DIGESTION, $\bar{x}$	3.0	1.?	2.0	2.5
SEX	9M, 1F	4M, 6F	6M, 4F	2M, 8F

■ = ABUNDANCE VALUES
• = <1.0

NORTH ALEUTIAN SHELF

SUMMARY OF GUT ANALYSES FOR YELLOWFIN SOLE

1982 - 1983 | FIGURE 6.5-"

The major items in the diets _L. aspera_ were polychaetes, crustaceans, bivalve molluscs and echinoderms; the use of these items varied with transect and depth (Table 6.5-1). Fish collected along transect 9 at both depths utilized polychaetes to a greater extent, both in terms of numbers and volume, than fish from transect 3. Fish along both transects at 30 m used more crustacea taxa than those from 60 m. The number and volume of crustaceans used along transect 9 were greater than from transect 3. A greater number of bivalve taxa were utilized at transect 3, and, although total bivalve densities per stomach were approximately the same, bivalve volumes were greater from transect 3. Greater numbers of bivalves were eaten at 30 m than 60 m on both transects. Echinoderms were of minor importance at all stations except at 60 m on transect 3. Echinoderms, primarily small, whole sand dollars (_Echinarachnius parma_) represented 30 percent (by volume) and 71 percent (by number) in the guts of these fish.

Stomach analysis results for _L. bilineata_ are summarized in Figure 6.5-2 and Table 6.5-1. These fish were also smaller at shallower (30 m) than deeper (60 m) stations. _L. bilineata_ age averaged approximately two years at shallow stations, and three to four years old at deeper stations. The smaller fish generally utilized fewer prey taxa than larger fish.

L. bilineata diets were dominated by polychaetes, followed by bivalves and crustaceans; variations by station and transect were evident. Polychaete abundance in fish diets was approximately the same at the three stations where they were utilized, ranging from 12 to 18 percent of the diets. No polychaetes were found in stomachs of fishes collected at the 30 m station along transect 9. Bivalve molluscs, primarily _Cyclocardia_ sp. along with unidentified bivalve siphons, were the major diet item from the 30 m station on transect 9, representing 34 percent of the stomach contents of these fish, by volume. Bivalves were less abundant in guts at the other three stations, ranging from 3 to 11 percent by volume. Crustaceans were of minor importance with the

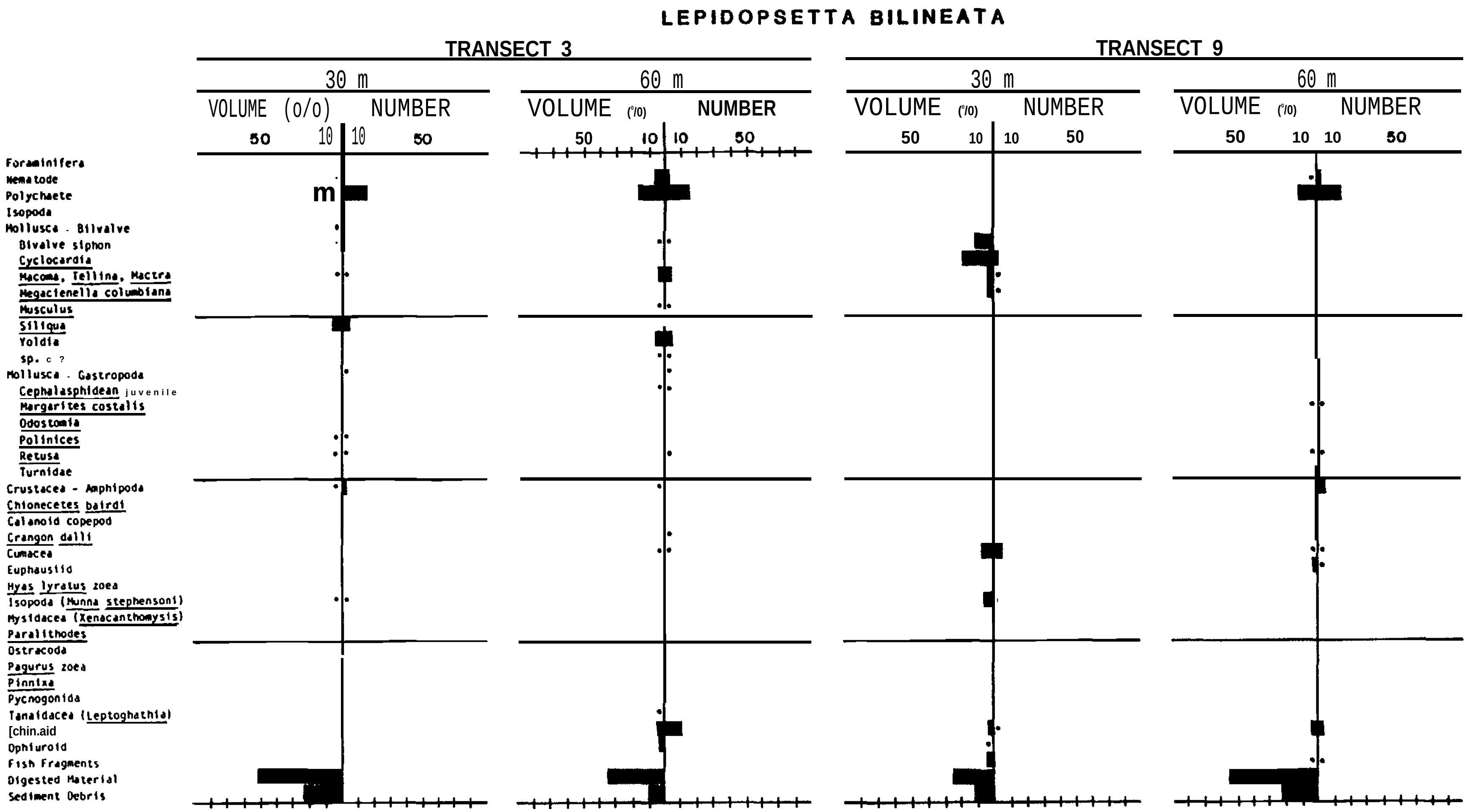
TABLE 6.5-1

COMPARISON OF PREY ITEMS BETWEEN YELLOWFIN AND ROCK SOLE

	Mean Number								Mean Volume (%)							
	L. aspera				L. **bilineata**				L. aspera				L. **bilineata**			
	Transect 3		Transect 9		Transect 3		Transect 9		Transect 3		Transect 9		Transect 3		Transect 9	
Taxon	30m	60m	30m	60m	30m	60m	30m	60m	30m	60m	30m	60m	30m	60m	30m	60m
Foraminifera	o	0.4	0.1	0	0	0	0	0	0	0.4	0.1	5.9	0	0	0	0
Nematoda	0	0.4	0.1	0	1.1	0.8	0	1.3	0	0.4	0.1	0.5	0.5	6.4	0	0.8
Polychaeta	0	1.2	19.7	2.5	14.8	13.8	0	14.8	0	1.3	20.8	12.6	18.4	18.4	0	11.7
Bivalvia	10.9	4.7	10.0	2.2	2.5	8.4	5.5	2.3	17.2	17.9	12.0	2.1	4.6	11.4	33.7	3.0
Gastropoda	2.0	2.0	0.9	0.5	0.8	1.4	0	1.5	2.3	0.8	0.8	0.9	0.5	0.6	0	0.9
Crustacea	26.9	3.1	44.2	11.0	1.1	3.6	4.5	6.4	27.2	7.6	29.8	18.1	2.5	2.7	11.1	3.2
Echinodermata	0.5	71.5	0.2	0.8	0	9.6	0.3	1*4	0.2	36.1	0.5	1.2	0	4.7	1.9	3.3
Cordata	0	0	0	0.2	0	0	0	0.2	0	0	0	0.1	0	0	2.5	0.1
Detritus									0	0	0	0	0	0	0	0.3
Digested Material	-	-	-	-					23.6	32.5	28.6	40.7	51.9	35.7	27.3	55.1
Sediment Debris	-	-	-	-					26.5	1.3	6.6	15.8	23.7	10.0	11.2	20.4

- = Not determined

LEPIDOPSETTA BILINEATA



	Transect 3, 30 m	Transect 3, 60 m	Transect 9, 30 m	Transect 9, 60 m
NUMBER OF SAMPLES	10	9	9	10
FISH SIZE, $\bar{X}$ (mm)	161.2	194.2	158.4	231.0
FISH SIZE, RANGE (mm)	11s-206	15 S-263	112-268	164-330
NUMBER OF PREY TAXA	11	18	9	12
FULLNESS, $\bar{x}$	2.8	2.7	2.7	2.6
DIGESTION, $\bar{x}$	3.6	2.6	3.2	3.7
SEX	10M	5M, 4F	8M, 1?	2F, 8?

. . <1.0

■ ‘ ABUNDANCE VALUES

• =< 1.0

NORTH ALEUTIAN SHELF

SUNNARY OF GUT ANALYSES FOR ROCK SOLE

VTN 1982 - 1983 FIGURE 6.5-2

exception of fish at 30 m on transect 9 where cumaceans were abundant in the guts. Echinoderms, primarily small sand dollars, were abundant in guts from fish at the 60 m contour along transect 3.

These two flatfish species had large differences in their diets. Limanda aspera is considered an opportunistic feeder which utilizes a wide variety of prey items (Pereyra, et al. 1976). Small specimens (100-200 mm) in the Bering Sea have been reported to feed primarily on amphipods and polychaetes (Bakkala 1981; Pereyra, et al. 1976); whereas small specimens of Lepidopsetta bilineata feed primarily on polychaetes, followed by molluscs, and then crustaceans (Pereyra, et al. 1976). The relative importance of major prey taxa in the diets of these two species as examined during this study is shown in Table 6.5-2. The main dietary difference was the greater use of crustaceans (primarily amphipods) by L. aspera. L. bilineata consumed more polychaetes, while L. aspera used more echinoderms. These results generally agree with previous studies cited. The use of small sand dollars was not important in the diets of fish in other reports; the use of this prey in the present study occurred primarily at one station.

Sea Otter Feeding Habits. Results of scat analyses indicate that crustaceans (crabs, shrimp and amphipods), molluscs (clams and mussels), echinoderms (sand dollars) and chordates (fish) were the most frequent food items (Table 6.5-3) . The small sample size and collection period limits the ability to develop a diet for this sea otter population solely on these results. The sample size was small (9) and samples were collected from only one site (Glazenap Island near Izembek Lagoon) over a two-day period. A generalized picture of sea otter diet can be derived, however, by considering additional information from other studies.

A data base of sea otter prey from scat and stomach content analyses, and dive observations from this study and other eastern Pacific investigations is summarized in Table 6.5-4. Species were lumped into ecologi-

TABLE 6.5-2

RELATIVE IMPORTANCE OF FLATFISH PREY TAXA(a)

Major Prey Taxa	Flatfish Species: Limanda aspera	Flatfish Species: Lipidopsetta bilineata
Polychaetes	8.7	12*1
Bivalves	12.3	13.2
Crustaceans	20.7	4.9
Echinoderms	9.5	2.5
TOTAL	51.2	32.7

(a) Values are mean percent of total stomach vol ume

TABLE 6.5-3

ORGANISMS IDENTIFIED FROM SEA OTTER SCATS

Prey Items	Samples 1	2	3	4	5	6	7	8	9	Percent Frequency Taxa	Phyla
Phylum Cnidaria (Total)										-(a)	11
Hydroid						p(b)				11	
Phylum Nemertina (Total)											11
Nemertean								1(c)		11	
Phylum Mollusca (Total)											67
Bivalve*(d)	P						P			22	
Macoma balthica		1								11	
Mytilus edulis*			P	P	P					33	
Phylum Arthropoda (Total)											77
Amphipod				P				P		22	
Brachyura										-	
Brachyura*	22			1+					1+	33	
?Chionoecetes						1			1	22	
?Cancer								1+		11	
?Erimissus		1								11	
Oregonia gracilis						1				11	
Carid											
?Crangon		7								11	
Crangon alaskensis								1+		11	
Crangon dalli				1						11	
?Pandalid		1								11	
Phylum Echinodermata (Total)											44
Echinarachnius parma	P	P			P	P				44	
Phylum Chordata (Total)											22
Pleuronectid*	5+									11	
(?Limanda aspera)								2		11	
Scorpaeniform								2		11	

(a) - = Not calculated

(b) p = present

(c) Values represent numbers of animals per scat

(d) * = Important prey items (see text)

TABLE 6.5-4

SEA OTTER PREY ITEMS FROM OTHER EASTERN PACIFIC STUDIES

Sample	ALEUTIAN ISLANDS						BERING SEA/PRINCE WILLIAM SOUND							OREGON/CALIFORNIA		
	Amchitka, AK					Attu, AK	N. Aleutian, AK	Bering Sea		Shumagin, AK		Green Is, AK	Sheep Bay	Oregon	Piedras Blancas, CA	Buchon, CA
			Sp. 1962	Fall 1962	Sp. 1963											
	Dives (%F)	Scats (%F)	Stomachs (%F)	Stomachs (%F)	Stomachs (%F)	Dives (%F)	Scats (%F)	Stomach (%V)	Scats (D)	Scats (%F)	Stomach (%V)	Dives (%F)	Dives (%F)	Dives (%F)	Dives (%F)	Dives (%F)
Division Phaeophyta	3														<1	
Phylum Cnidaria						<1	11								11	
Phylum Annelida/ Nemertina			5+		5		11									
Phylum Echiuroida												3				
Phylum Mollusca																
Abalone															2	3
Clam	4	1	1		3+	2	33	68+	20+	8	99	44	70	2	2	
Mussel/scallop	<1	21+	28+	12+	24+	3	33	<1	?	77+	1	40	22	3	2	<1
Octopus		1	12	4	14	4								1	6	
Snail/chiton	<1	6+	10+	5+	10+	1				5				2	13	10
Phylum Arthropoda																
Amphipod			5		6		22									
Barnacles															1	
Crabs - Brachyura	1	16	5+	5+	5+	4	66	7	1	16		2	2	6		13
- Hermit			3	3	9			24	3						31	
Isopods			6		3											
Shrimp			1		1		33									
Phylum Echinodermata																
Brittle star			1		13											
Sand dollar							44									
Sea cucumber	<1		17	4											<1	<1
Seastars			29+	2	28+	1								1	1	
Sea urchins	47	95	71	17	92	74				4				64	1	52
Phylum Chordata																
Tunicates			4	1	6											
Fish	12	15	22+	4+	87+	<1	22	50	1	10						
Sample Size	580	422	107	20	182	563	9	2	2	75	2	420	251	425	820	567
Reference	(1)	(2)	(2)	(2)	(2)	(2)	(3)	(2)	(2)	(2)	(2)	(1)	(1)	(4)	(1)	(1)

%F = Percent Frequency
%V = Percent Volume
D = Density
(shaded) = Important prey

References:
(1) Estes, et al. 1981
(2) Kenyon 1969
(3) This Study
(4) Estes, et al. 1982

tally equivalent prey items (e.g., cl ares), so different geographical areas could be compared. As a result, where several species occurred in one of these taxa, the largest value was taken to represent the minimum frequency level. A precise level could not be determined for such prey without the original data since the distribution of all the prey items in that taxa was not provided.

Arthropod crustaceans were the most frequently found organisms in the scats from the present study. These prey included brachyuran crabs, shrimp and amphipods. Brachyuran crabs were identified as otter prey items in almost all of the studies cited (Table 6.5-4) and were found in 66 percent of the scats examined for this study. Crabs in the study area are large, should be easy to catch and in general have a high caloric value (Kenyon 1969). For these reasons crabs are considered to be an important sea otter prey item in the study area.

Shrimp and amphipods were found in 33 and 22 percent of the scat samples from this study, respectively. Even though both organisms are abundant throughout the study area, they were small, were not found in otter stomachs during other Bering Sea studies and have rarely been found in the guts or feces in any other area. For these reasons, shrimp and amphipods are not considered important prey items.

Molluscs constituted the second most frequent prey items in this study. Clams (Macoma balthica and bivalves) were found in 33 percent of the scats. These organisms have been found in the stomachs of other Bering Sea otters and have been identified as prey items in all other reported studies of eastern Pacific otters. These organisms are found throughout the study site, with epifaunal mussels attached to more stable substrates and infaunal clams inhabiting soft sediments. They are easy to capture, and caloric value is moderate to high (Kenyon 1969). Mussels and clams can be considered as important prey items to the otter population in the study area.

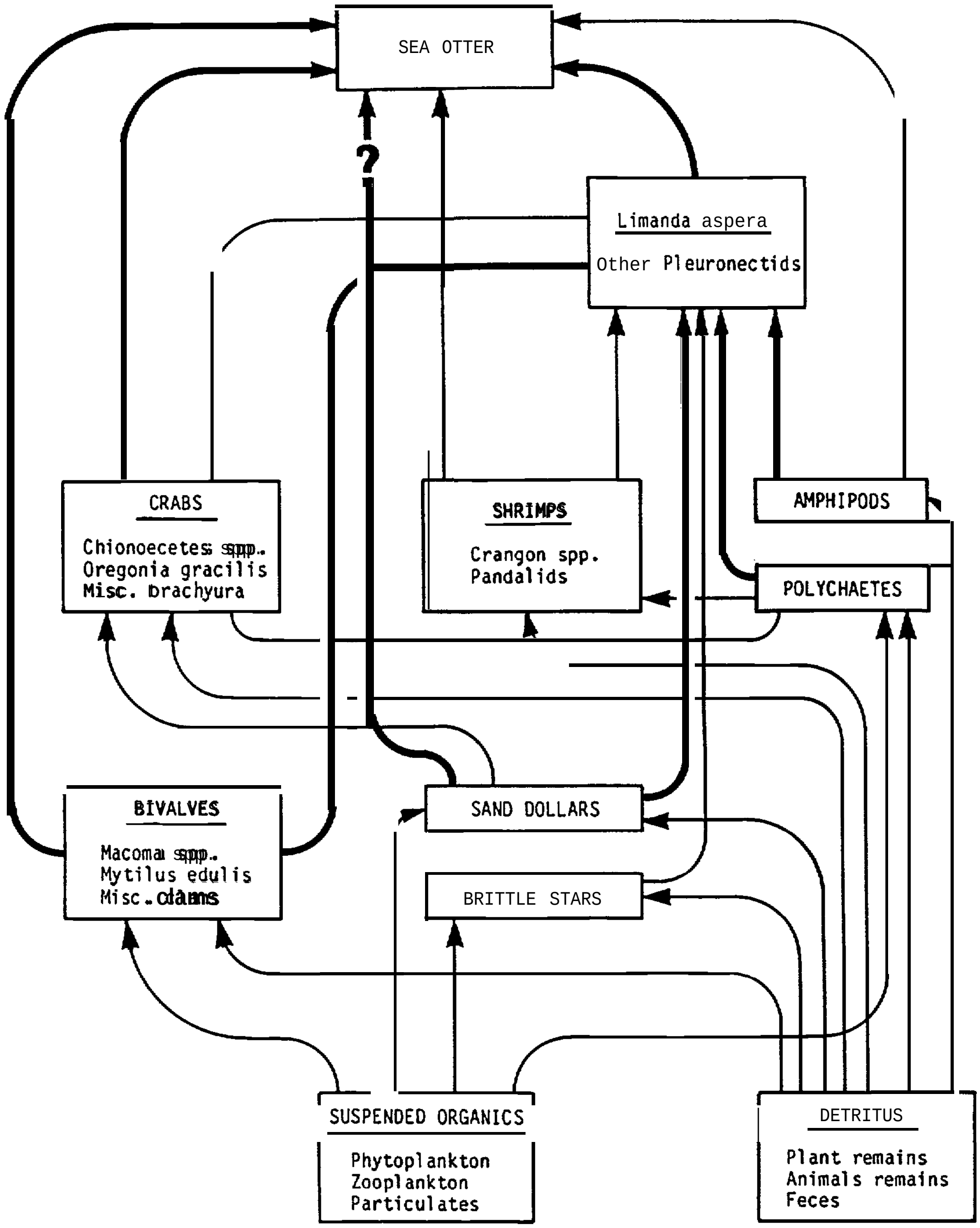
Sand dollars were the third most frequent food item. This organism was abundant in the study area, being collected in high abundance both in epifaunal and infaunal samples, as well as in the guts of flatfish. Whether the otters directly ingested the sand dollars or ingested fish which had eaten them is not certain. Since three of the four scats with sand dollars did not have any fish parts, direct ingestion may occur. If otters are feeding on sand dollars, the organisms might be on important prey item due to their high frequency in the scats, high abundance in the area and the"ir ease of capture and ingestion. Sand dollar coloric value, however, is probably low compared to other prey items. These results provide the first known report of sand dollars possibly being a sea otter prey item, probably since sand dollars, inhabiting the open coast sandy areas, and sea otters, living in rocky regions with kelp or protected embayments, rarely co-occur.

The fourth most frequent prey item in the scats were fish, particularly flatfish (Pleuronectids). These prey items, particular yellowfin and rock sole, are extremely abundant in the study area (see Section 6.3) and comprised 50 percent by volume of the sea otter stomachs sampled in the Bering Sea (Kenyon 1969). Fish have been reported to be important prey items in all other areas of the Aleutians, and otters are reported to prefer them over sea urchins (Kenyon 1969). Flatfish are easy to capture, easy to ingest (the presence of five lower jaws in all scats sampled indicates they may eat the entire animal) and are high in calories (Kenyon 1969). Finally, the seasonal and spatial distribution of the flatfish and crab populations within the study area corresponds with and could be an important factor regulating the temporal and possibly spatial distribution of the sea otters. For these reasons fish are considered an important prey item to the sea otters.

Several species which have been found to be common prey items in other areas, but not the Bering Sea, are sea urchins, gastropod (limpets and chitons) and hermit crabs. Sea urchins are usually found on rocky, stable habitats often associated with kelp. Sea urchins were collected stable habitats often associated with kelp. Sea urchins were collected in low abundance in trawls off Unimak Island and observed during dives of rocky areas off Amak and Unimak Islands. Although no sea urchin tests and/or spines were recorded from the scats in the Bering Sea, other evidence indicates that otters are feeding to some degree on these prey. Several of the sea otter skulls examined near the entrance to Izembek Lagoon were stained purple, evidence of sea urchin predation (Kenyon 1969). Sea urchins are not considered an important prey item in the study area, but would be more important if these animals are seasonally migrating into the Pacific during the winter where kelp beds and sea urchins may be abundant. Hermit crabs or their mollusc shell homes were not found in these scat samples even though they have been reported in other Bering Sea studies and were extremely abundant in the epifaunal surveys.

A preliminary sea otter food web was developed from the results of sea otter scat analyses and fish guts examined in this study and information obtained from other investigations (Figure 6.5-3). These results suggests that flatfish are important prey items and could be competitors for prey with sea otters, but more likely these predators might partition the common resources based on prey size.

Comparisons were made in abundance of sea otter prey items in different areas as determined with epifaunal trawls. The mean biomass values per sample for these taxa, organized by the epifaunal site groups discussed in Section 6.3, are presented in Table 6.5-5. The greatest number of otter prey taxa was found in site groups IA1 and IA2; the highest biomass values for two of the prey taxa, Cancer spp. and Limanda aspera, were found in site group 11. The distribution of site group IA, as shown in Figure 6.3-2, includes all depths sampled in the Bechevin Bay-Izembek Lagoon area, intermediate and greater depths east and west of the lagoons, and the shallow depths in the Port Moller area. Group II sites were at the mouths of Bechevin Bay, Izembek Lagoon and Port Moller (Figure 6.3-2).



SOURCE : **Present Study; Feder and Jewett 1980**

ENERGY PATHWAYS

Major Importance

Minor Importance

NORTH ALEUTIAN SHELF

PROPOSED SEA OTTER FOOD WEB

1982 -1983 | **FIGURE 6.5-3**

TABLE 6.5-5

COMPARATIVE ABUNDANCE OF SEA OTTER PREY IN EPIFAUNAL COMMUNITIES

	Mean Biomass(a) by Epifauna Site Groups(b)				
	Group I A1	Group I A2	Group 161	Group 162	Group 11
Otter Prey Taxa(c)					
*Bivalve	0.1	5.2	0.0	000	0.0
Mytilus edulis	0.0	39.8	0.0	0.0	0.0
(Siliqua patula) (d)	0.1	3.5	0.0	0.0	0.0
(Cyclocardia sp.) (d)	<.1	0*0	0.0	0.7	0.0
*Chionoecetes spp.	157.4	0.3	0.0	3.2	0.0
*Cancer spp.	0.4	88.8	0.0	18.0	152.5
*Oregonia gracilis	0.0	92.8	0.0	6.0	0.0
*Echinarachnius parma	29.4	2,020.0	0.0	129.5	0.0
*Limanda aspera	12,344.0	2,723.0	7,240.0	4,005.0	18,536.0
Otter Prey Taxa(e)					
Snails	10.5	2.5	199.0	30.3	0.0
Hermit crabs	59.2	5.5	306.6	74.6	0.0
Shrimps	56.2	7.0	68.8	552.4	10.0
Sea cucumbers	0.3	1.0	44.3	7.0	0.0
Seastars	1,660.0	2.0	15,388.0	1,473.0	1,120.0
Sea urchins	0.7	10.3	5.6	0.1	0.0
Tunicates	331.4	0.0	11,300.0	448.6	40.0
Flatfishes(f)	18,337.0	8,375.0	16,135.0	9,202.0	22,731.0

(a) Grams per trawl

(b) Groups from similarity analysis

(c) Taxa found only in otter scats and epifaunal samples, this study

(d) Not specifically identified from otter scats

(e) Taxa reported from other studies and found in epifaunal samples, this study

(f) Including Limanda aspera

* = Major prey items

Sea otter prey items found in other studies are also 1 isted in Table 6.5-5, with corresponding mean biomass values for epifaunal site groups determined during the present study. The greatest mean biomass values for most prey taxa occur in site group IB1. The distribution of this site group is primarily in areas not occupied by site group IA, namely deeper stations off Izembek Lagoon and Port Moller, and shallow stations between Izembek Lagoon and Port Moller as well as the central Unimak 1s1 and coast (Figure 6.3-4).

The data available from this and other studies indicate that sea otters in the areas offshore the coastal lagoons and bays have large food resources of flatfish, crabs and clams available, and that areas between the lagoons and bays contain a greater variety of invertebrate food resources. The seasonal aspects of sea otter food resources are not clearly understood for the North Aleutian Shelf study area. Adult red king crabs (Paralithodes camtchatica) move into the area during summer from deeper wintering grounds; adult yellow fin sole migrate east into Bristol Bay during the summer (Bakkala 1981).

Comparisons in the abundance of selected infaunal and epifaunal parameters were made among areas and depths of high and low otter abundance to assess the relative importance of otters versus other environmental variables on these organisms (Table 6.5-6). Most values correspond primarily with physical factors. For instance, the low abundance of organisms in shallow depths (0-20 m) in all areas is attributed to the apparent harsh inshore conditions. Large clam and flatfish abundance was high in all sandy areas, regardless of depth. Seasonally, the abundance of clams was greatest in June and decreased through the summer. This trend could be attributed to otter or fish predation. Total epifaunal biomass and yellowfin/rock sole biomass was higher in August and October in shallow habitats and lower in deeper waters. This distribution and abundance corresponded with the abundance of sea otters. The seasonal movement of flatfish (an apparent primary prey item of the otters) to shallower waters and co-occurrence with otter

TABLE 6.5-6

COMPARATIVE ABUNDANCE OF BENTHIC INFAUNA AND EPIFAUNA

		June			August			October		
		0-20	21-40	41-60	0-20	21-40	41-60	0-20	21-40	41-60
Area	Transects	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)
Infaunal Species (mean/0.25 m^2)										
Unimak	1-2	15	30	26			31		14	32
Izembek	3-6	12	18	40			46		27	34
Black Hills	7-8	10	25	25			26		10	32
Port Moller	9-11	8	18	29			33			33
Infaunl Specimens (mean/0.25 m^2)										
Unimak	1-2	384	445	116			231		93	158
Izembek	3-6	102	115	407			364		339	304
Black Hills	7-8	49	243	152			300		68	1,988
Port Moller	9-11	48	344	526			502			301
Diversity (H)										
Unimak	1-2	1.20	2.37	2.50			2.20		1.42	-
Izembek	3-6	1.73	2.06	2.00			2.88		2.15	2.69
Black Hills	7-8	1.76	1094	2.37			2.03		1.51	0.48
Port Moller	9-11	1.70	1.78	1.55			1.66		-	1.78

TABLE 6.5-6

(continued)

Area	Transects	June 0-20 (m)	June 21-40 (m)	June 41-60 (m)	August 0-20 (m)	August 21-40 (m)	August 41-60 (m)	October 0-20 (m)	October 21-40 (m)	October 41-60 (m)
Large Clams										
Unimak	1-2	2.6	12.4	15.8	-	-	9.3	-	2.5	9.0
Izembek	3-6	18.1	11.4	5.2	-	-	5.0	-	29.1	2.8
Black Hills	7-8	0.0	2.8	18.0	-	-	13.3	-	0.0	1.0
Port Moller	9-11	1.3	23.8	17.7	-	-	8.0	-	-	0.5
Total Epifaunal Biomass (kgms/trawl)										
Unimak	1-2	10.3	24.8	17.8	137.0	11.0	8.1	-	10.3	5.6
Izembek	3-6	20.8	67.3	41.9	28.0	-	17.4	30.2	27.5	11.9
Black Hills	7-8	9.8	11.7	99.3	18.2	64.7	35.6	22.1	-	18.9
Port Moller	9-11	-	130.4	137.0	60.8	35.9	52.4	16.0	20.5	13.5
Yellowfin and Rock Sole (kgms/trawl)										
Unimak	1-2	8.5	9.0	11.6	8.9	10.0	5.9	-	-	5.3
Izembek	3-6	18.5	45.6	35.2	-	19.5	16.1	18.8	17.0	6.6
Black Hills	7-8		9.2	40.6	9.5	-	27.9	-	-	14.3
Port Moller	9-11	-	60.9	61.3	37.5	22.6	28.3	5.1	17.0	6.4

- = Not determined

abundance in sandy areas suggests that the presence of flatfish and crabs might be the ultimate factor regulating the seasonal movement of otters between the Pacific Ocean and the Bering Sea.

These results suggest that the distribution of communities, abundance indices and most selected prey is regulated primarily by environmental factors, namely sediment and depth, not by sea otter predation. In turn, the seasonal and spatial distribution of otters appears to be regulated primarily by season (possibly triggered by higher temperatures and seasonal abundance of flatfish and crabs), secondarily by habitat (sandy areas with flatfish, crab and clares) and thirdly by distance from the source of migrating animals (Bechevin Bay).

Sea otters in the Kurile Islands of Russia were also reported to feed on fish, crab and octopus during the summer and sea urchins and molluscs during the winter (Shitikov 1971 cited by Estes et al. 1981). Results from this study indicate that sea otters migrate from the Pacific Ocean, where they feed (on urchins and molluscs?) in the winter, to the Bering Sea in the summer where they feed on fish, crab and clams. The movement of these sea otters correspond with the movement of crabs (Armstrong et al. 1983) and yellowfin sole (Bakkala 1981) to shallow waters in late winter-early spring. The migration of these otter prey items has been attributed to warmer temperatures and perhaps increased food supply. While the ulitmate factor regulating the seasonal sea otter migration may be to feed on flatfish and crab, the proximal factor may be temperature. Results of this study indicate a warm temperature plume in the study area centered off the Izembek Lagoon. The migration of flatfish to deeper waters in the fall occurs with decreasing temperatures (Bakkala 1981). By October, most of the otters have also left the area even though they are able to survive throughout the year at much lower temperatures. The overall high abundance of sea otters in the area is attributed to the high quality (abundance of prey items) and quantity (broad, shallow shelf for feeding) of the habitat.

6.6 Impacts of Oil and Gas Exploration and Development

Introduction. Determination of impacts includes evaluation of a series of interacting processes, namely those among the various phases of oil and gas exploration and development and the biological processes associated with the the sea otter's life history. Since there is a varying degree of knowledge in each step, there is an even greater uncertainty in the resulting projected impacts. This discussion follows the four major phases of oil development outlined by Geraci and St. Aubin (1980) in their review of impacts of oil on marine mammals (Table 6.6-l).

Exploration. Exploration involves seismic and drilling surveys, as well as air and vessel support. Seismic surveys produce shock waves which are known to injure and kill sea otters, depending on the strength and distance of the explosion, the nature of sea floor and water depth (Geraci and St. Aubin 1980). Sublethal affects may include avoidance of areas for feeding. Drilling, air support, vessel support and construction also result in increased noise and visual disturbances. Sea otters will likely react to noise, depending on level, by diving and swimming away. Such activity could reduce valuable feeding time. Some behavioral or physiological adaptations may occur with time as the animals become more exposed to the potential hazards. Maximum impacts would occur in the Izembek-Bechevin area where maximum otter densities and apparent migration occurs. Drilling also involves potential hazards of a blowout, thereby releasing oil. The potential hazard of oil spills will be discussed later.

Production. Production includes drilling, air support, vessel support and construction which all involve potential noise hazards as addressed earlier. Production also involves risks of oil spills. Factors regarding the potential impacts of an oil spill on sea otters are the location of the spill, size of the spill, season and local weather conditions. The location of the spill and weather conditions are major factors that

TABLE 6.6-1

SUMMARY OF SEA OTTER VULNERABILITY
TO OIL AND GAS EXPLORATION AND DEVELOPMENT

Project Phase	Physical Factor	Biological Response(a)	Important Considerations
Exploration			
Seismic explosions, drilling, air and vessel support	Noise	Possible mortalities; disturbance	Depends on decibles, environmental conditions, location of otters
Production			
Drilling, air and vessel support	Noise	Possible mortalities; disturbance	Depends on decibles, environmental conditions, location of otters
Drilling and vessel support	Oil spills	Probable mortalities (fouled fur and possible toxicities); probable disturbance (decreased feeding, slick, tainted prey, sediments)	Depends on physical and chemical characteristics and location of spill
Transportation			
Vessels	Noise	Possible mortalities; disturbance	Depends on decibles, environmental conditions, location of otters
Pipeline emplacement	Sediment disturbance	Possible mortalities; disturbance	Depends on location, size of area and period of disturbance
Onshore Facilities	Noise	Possible mortalities; disturbance	Depends on decibles, environmental conditions, location of otters
	Oil spills	Probable mortalities (fouled fur and possible toxicities); probable disturbance (decreased feeding, slick, tainted prey, sediments)	Depends on physical and chemical characteristics and location of spill

(a) Represents short-term impacts which may lead to mortalities. Subsequent implications of mortalities on long-term status of population are too variable to address at this time.

would determine the trajectory of the spill. Distance offshore and atmospheric conditions will al so determine the size and shape of the slick as well as the concentration of toxic components. Any spill near the center of the sea otter distribution, nearshore of the Izembek Lagoon and Bechevin Bay, would have the greatest impact on the otter population. The type of oil spilled is critical. Crude oil may damage the fur more, while refined oils may be more toxic. Much of the oil handled in the area would likely be crude. Finally, season is critical since oil spills, which are more likely to occur during the winter months because of rough weather, would only impact 10 percent of the total population, but if females and/or pups are present or if the oil settles to the benthos, longer-term impacts may occur.

Impacts of an oil spill on the sea otter depends critically on the ability of otters to avoid the spill. Both field and laboratory studies on sea otters have been conducted but are limited. Additional information has been extrapolated from studies on other marine mammals.

Otters would be susceptible to oil slicks since they spend much time on the surface feeding, cleaning, rafting and moving from place to place (Schneider 1981). Results of laboratory studies concluded that otters do not avoid oil (Siniff et al. 1982). These results are hard to extrapolate to field conditions due to the small size of the pool. Additional evidence indicates that otters can not avoid oil slicks. Otters often swim on their back with their head looking toward their tail (Danial Costa, UCSC, personal observation; Kenyon 1969). This swimming behavior may preclude visual observations of objects in front of them as is the case when otters are captured in tangle nets which extend down from the surface. Not all otters can be captured in this way; many see the net and either swim under or around it. Sea otters may respond to an oil slick in a similar way, with some animals swimming into it and being fouled while others might avoid it. The shape and size of the slick may modify their avoidance success.

Some evidence suggests that otters may avoid oil slicks. Barabash-Nikiforov, et al. (1947) indicate that Japanese poachers used petroleum products to herd otters away from the shore; sea otters apparently possess a highly developed sense of smell (Kenyon 1969) and may detect the petroleum odor, and thereby avoid the slicks.

Direct contact with oil is the most obvious and potentially damaging consequence of oil contamination to sea otters. Apparently, no oil spills have occurred in a sea otter population that has been closely monitored to determine impacts on the otters. Kenyon (1969) stated that the Shumagin Island population, south of the Alaska Peninsula, "was certainly reduced when a tanker and a freighter were wrecked and spilled oil in this area during World War II," and that "many sea otters and ducks were ki 11 ed by oil on the water (Kenyon 1964)". Kenyon did not indicate the number of mortalities nor the means of assessment.

The most common impact of oil contamination upon sea otters reported thus far is the loss of thermal insulation from fouling of the fur. Thermal homeostasis in sea otters is dependent upon the presence of an air layer entrapped in the very dense underfur (Costa and Kooyman 1982). When oil comes into contact with the fur this air layer is destroyed and results in a loss of heat. Otters have the highest heat production of any mammal of equal size (Costa and Kooyman 1982; Iversen and Krog 1973; Morrison et al. 1974). A large decrease in thermal insulation, as a result of fouling of the fur by oil, is likely to require a corresponding increase in heat production that could not be maintained for an extended period (Costa and Kooyman 1982).

Oil fouling of 30 percent or more of the sea otter's fur surface is estimated to result in death from hypothermia or pneumonia (Costa and Kooyman 1979). Otters coated with oil up to 10 percent of their body surface survived at least 20 days. In a similar study, Siniff et al. (1982) found that sea otters survived between four days to three weeks after the application of 25 mls of crude oil. In both studies, increases in oil exposure increased the time spent grooming, specifically the oil-fouled fur. However, these studies were conducted during the summer when the weather is mildest and the animals could forage in areas where prey availability was high. In rough weather when tanker or other oil development accidents could be more likely, the otters foraging ability might be reduced, making the animals more susceptible to ramifications associated with spills.

The sensitivity of sea otters to oil toxicity has not been directly examined due to the more profound thermoregulatory consequence of loss reduced thermal insulation due to oil-fouled fur. However, toxic effects may prove to be important when otters are exposed to quantities of oil insufficient to cause immediate death from hypothermia or pneumonia. Several studies have shown that sea otters can survive small amounts of crude oil (10% of the body surface covered, Costa and Kooyman 1979; 25 mls, Siniff, et al . 1982). However, the oil was removed by the otters grooming activities, which included licking of the oil-fouled area. Therefore, as the fur is groomed, oil is ingested and could result in acute or chronic systemic toxicity.

Analysis of other studies does not firmly establish if ingested oil is toxic to sea otters. Sea otters ingest and process the largest material and fluid volume of any marine mammal of its size, and therefore could be ingesting large quantities of potentially toxic compounds. However, this large fluid intake could also help to flush ingested oil compounds out of their system, thereby preventing accumulation to toxic levels.

Sea otters exposed to oil under laboratory conditions did not exhibit noticeable toxicity from oil ingestion (Costa and Kooyman 1982). However, these otters were exposed to oil for only 12 hours in three experiments and six days in one experiment. Such brief periods could have precluded the ingestion of significant amounts of oil. Free-ranging sea otters that were oiled and followed via radio-transmitters for two to three weeks in the field did not exhibit obvious toxic effects (Costa and Kooyman 1979). In addition, Siniff et al. (1982) did not rule out the possibility of death due to oil toxicity in one otter that died after swimming in an oil-coated pool for 12 hours.

Little is known concerning the indirect effects of crude oil, but these may include environmental contamination that may result in reduction or avoidance of prey items and habitat. Oil uptake by prey organisms could result in the death of the prey due to oil toxicity or to its becoming tainted and unpalatable to sea otters. Sediments tainted with oil might also inhibit feeding. The turbulent nature of the area and relatively unstratified water column of the North Aleutian Shelf (Schumacher et al. 1979) increases the chances of oil being transferred to the benthos (Curl and Manen 1982). Impacts of oil are known to have long-term impacts on benthic organisms, such as clams (Armstrong et al. 1982) which are important sea otter prey.

Further indirect effects could result from general habitat loss as the sea otters move out of the area to avoid slicks. Time lost from feeding is critical to sea otters; otters are estimated to use 30 percent of their time feeding (Loughlin 1977, Shimek and Monk 1977) and adults ingest 23 to 29 percent of their body weight per day (Kenyon 1969). Starved animals loose 10 percent of their weight per day and a weight loss of 23 to 24 percent (2 to 3 days time) would be lethal (Miller 1974). In Alaska, many animals starve to death during the winter (Miller 1974) and during years of low food abundance (Kenyon 1969). Females will abandon their pups in late winter and early spring when food is scarce (Miller 1974). Time lost from feeding due to the oil spill would be critical, especially at times of additional stress such as low winter temperatures, low food availability and other ramifications of oil and gas exploration and development, such as cleaning oiled fur.

<u>Transportation.</u> This phase involves transport vessels and pipeline emplacement, involving potential noise and other hazards discussed

previously. Pipeline emplacement can also disturb the bottom and impact potential prey items. However, this impact would be local and therefore minimal .

Transportation also involves onshore support in which potential onshore activities may affect the sea otters. Since most potential onshore facilities (Cold Bay and Port Moller) are removed from major otter populations, onshore activity would not pose a problem to the otter population in general. If Bechevin Bay and False Pass are major routes for migrating otters, onshore activies in those regions could be of consequence.

All phases of the development of inshore operation that might intersect migration routes could impact otters. Such impacts could include boat collisions and disturbances. The major impact again would occur in the otter area of greatest abundance.

Summary. Recovery rates of the sea otter population following impacts is necessary to assess long-term impacts of oil pollution. Estimates of recovery rates depend upon the cause, duration and resulting impacts as well as responses of the surviving population. Recovery from direct impacts due to toxicity or fouling of fur would vary. Minimal recovery time would occur if impacts occurred during the winter on a male dominated population. In such a case, only a few animals would be affected and recovery would be relatively fast. Longer recovery times would occur if impacts occurred either during the summer when most of the population would be present or in winter if the population consists of females and pups. In addition, there is the possibility that if most of the animals are seasonally migrating to the area, recovery may take longer if the animal’s seasonal migration route is affected. Recovery following indirect effects may take even longer if the cause of the impact (oil) persists. If prey or sediments are tainted or contaminated by oil, thereby preventing feeding, animals would either starve or leave the area and possibly not return for a long time.

The range of scenarios of possible oil spills (size, kind, area, etc.) and lack of additional information on the population biology of the local population (seasonal migration route, population structure of winter and summer animals), vulnerability to oil (avoidance, toxicity) and ability to recover makes it difficult at this time to predict impacts more accurately. Sea otters are extremely vulnerable to oil spills under certain conditions that would result in major impacts if: oil comes into contact with the fur; noise, oil slick, odor, tainted food or sediments disrupts feeding; large numbers of females are killed; or seasonal migratory patterns are changed. If none of these events occur or if they are only minor, impacts would be considerably less.

SECTION 7.0

CONCLUSIONS

A series of field studies were conducted on nearshore biotic systems along the North Aleutian Shelf with emphasis on the distribution and abundance of the dominant infaunal and epifaunal communities, the resident sea otter population, the trophic interactions among these biotic systems and the impact of oil and gas development on the sea otters.

Nearshore bathymetry indicates a large shallow water shelf at depths less than 60 m where otters can forage. Areas around the embayments (Izembek Lagoon, Bechevin Bay and Port Mol 1 er), where the otter abundance is often highest, had the largest shelf areas.

Surface and bottom water temperatures ranged from 6.0 to 10.1"C and 5.0 to 9.5*C, respectively, with August values at the surface (9.0°C) and bottom (9.3°C) higher than in June (7.6 and 6.3*C) or August (6.9 and 6.9°C). Peak temperatures in August corresponded with the highest abundance of sea otters. Within the study area, a thermal plume originates in the Izembek area and disipates with the current to the northeast. These results suggest that warm waters either enters the area via False Pass and Bechevin Bay, or are generated within the shallow coastal embayments, and then mixes with the cold counter-clockwise gyre moving towards Port Moller. Such a thermal plume may affect sea otter seasonal migration.

Soft sediments in the area are primarily sand with varying amounts of gravel and silt. Shallow waters (10 m) are homogeneous and characterized by well-sorted sands, deeper waters (30-60 m) are more heterogeneous, characterized by poorly-sorted sand and gravel. Areas removed from the embayments (Unimak Island, Black Hills and Cape

Seniavin) have the highest gravel content (10-80%). Areas near the coastal embayments and in shallow waters, where the highest abundance of otters have been reported, are composed of sand with little gravel.

Infaunal samples were dominated in terms of species composition by polychaetes, molluscs, crustaceans and echinoderms. Cluster analysis resulted in the identification of three communities whose distribution corresponded with depth and gravel content of the sediments. Community I was a shallow (0-20 m) community in the sandy substrates along the nearshore areas of the study site characterized by the clam Siliqua patula. Community 11A was a deeper community (usually at 30 m) inhabiting the sediments of high gravel content off Unimak Island, Port Moller and Cape Seniavin and characterized by the polychaete Owenia. Community IIB was the deep (30-60 m) community found in sandy substrates characterized by the sand dollar Echinarachnius parma. Highest otter abundance occurred were associated with the two sandy communities (1 and IIB).

Epifaunal samples were dominated (by weight) by yellowfin sole (Limanda aspera), rock sole (Lepidosetta bilineata) and seastars (Asterias and Evasterias). Cluster analysis resulted in the identification of major communities whose distribution and species composition varied in substrate type and geographical location. Site group IA was characterized by adult flatfish inhabiting soft sediments. Site group IB was characterized by a mixture of hard-bottom organisms such as barnacles, hermit crabs and tunicates. These two communities overlapped spatially more than the infaunal communities. This can be attributed to the less descrete nature of the epifaunal trawls and patchy nature of the two substrate types. The seasonal and spatial distribution and abundance of the sea otters corresponded with the abundance of flatfish and crabs.

Sea otter abundance varied significantly ($p < .05$) with season, depth and area. Results indicated two seasons: a summer period (July-September) of high otter abundance, and a winter period (October-June) with 90 percent fewer otters. Otters were more abundant in shallow waters (0-20 m) in the Izembek area. Results strongly suggest that the otters migrate in early summer from the Pacific via False Pass to the study area. The seasonal and spatial abundance of otters corresponded with and, is hypothesized to be a result of, the movement of crabs and flatfish, important prey items. Most of the otters migrated out of the area by October, well before winter ice.

Scat studies indicate that sea otters fed primarily on crabs, bivalves, fish and possibly sand dollars. Such results suggest that otters are feeding on some of the most available prey in terms of abundance and accessibility. Other common sea otter prey, particularly sea urchins and hermit crabs, were not found to be common prey. Fish could be the most important prey item based on their usage in other Alaskan areas, abundance in the study area and their close correspondence with the distribution and abundance of sea otters.

A literature review of potential impacts of oil and gas exploration and development was conducted on the sea otters, and in particular their interactions on the benthic habitats. Studies indicate that oil spills and blowouts potentially pose the most serious large-scale and long-term effect; sonic booms, noise, visual disturbance and boat traffic all would probably have local, short-term effects. Oil spills could result in direct mortalities due to fouling of the fur inducing pneumonia or toxicities. Indirect impacts, that include avoidance of feeding areas due to surface slicks or tainting of prey, may lead to starvation and may be just as damaging.

The greatest impacts would occur: seasonally, in the summer (approximately July-September) when the largest number of animals are present in the winter (if the remaining population is composed primarily of females); and spatially, near Izembek Lagoon and Bechevin Bay where most of the otters were found. Outside the study area, the Bechevin Bay/ False Pass region may be an additional critical habitat if the summer population migrates through this area. Long-term impacts could occur for years following the initial incidents: if the summer sea otter population is not able to avoid oil slicks; if oil slicks prevent feeding; if oil contaminates prey items or sediments and inhibits feeding. Such impacts would either reduce the reproducing population and/or create an uninhabitable environment for the sea otters.

SECTION 8.0

SUGGESTED STUDIES

Results from this investigation indicate the need for additional studies to address specific issues. This discussion is presented according to the six study objectives.

Physical Factors. Substrate type was found to be a primary factor regulating the distribution of both the infauna and epifauna. Results indicate a patchwork or mosiac of habitat types distributed on a small and large scale. Since samples of soft substrates were taken at descrete stations within and between habitats, the scale of variability needs resolution. The use of side scan sonar in the area could provide a more continuous distributional map of types of infaunal, epifaunal and sea otter prey habitat.

Infauna. These studies described the major infauna communities. Many large clams which are believed to be present in the study area were not collected with the Van Veen grab. Many are located below the 16 cm sediment depth that the grab penetrates. Therefore, studies of the distribution of large clam species which may be important sea otter prey items would be helpful.

Epifauna. Studies using the small trynet in the deeper (20-60 m) portions of the study area adequately described the epifauna, with the possible exception of larger fish. Seasonal studies in shallow waters which could not be sampled during the fall and winter are needed to fill in the data gaps regarding habitat usage by flatfish and other species as well as the availability of prey to sea otters.

Sea Otters. Results strongly suggest the seasonal movement of otters in and out of the study area, probably through False Pass. Studies are needed to determine the specific role of the various areas on the populational biology of the sea otters. This information is necessary to critically evaulate short-term and long-term impacts of oil on the otters.

Trophic Interactions. Results from the limited otter feeding data collected are consistent with other studies in the area and other parts of Alaska. Additional studies from different areas and seasons would help to clarify seasonal and spatial variability in otter feeding habits. This could be accomplished through additional scat collections and/or stomach analyses.

Impacts of Oil and Gas. Results generated from a review of the literature indicate that otters are potentially highly susceptible to impacts from oil and gas exploration and development. However, their actual susceptibility is largely dependent on three unknown variables: their ability to avoid oil slicks, impacts of oil slicks on feeding behavior, and the impacts of contaminated or tainted prey on feeding. These three field studies would be needed to more accurately determine short-term and long-term impacts. The results of these studies along with the information generated from the sea otter populational studies suggested above will provide a more precise estimate of impacts.

SECTION 9.0

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SECTION 10.0

APPENDICES

Appendix A	Modifications of sediment analysis from ASTM (1982)
Appendix B	Hydrography data
Appendix C	Taxonomic list of organisms identified
Appendix D	Raw data from infaunal samples
Appendix E	Raw data from epifaunal samples
Appendix F	Raw data from sea otter surveys

APPENDIX A

MODIFICATIONS OF SEDIMENT ANALYSIS FROM ASTM (1972)

Homogenization was accomplished by kneading the sample bag for several minutes. Following digestion of organics, the samples were wet sieved on a No. 230 sieve. Material passing through the sieve was then transferred to a settling chamber; the remainder was dried at 103°C, cooled, weighed and placed on a nest of sieves of varying sizes (Nos. 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170 and 230). The material retained on each sieve was then weighed. Approximately 30 grams of the material which passed through the No. 230 sieve was transferred to a settling chamber; 5 ml of sodium hexametophosphate was added and diluted to 1 liter with deionized water. The samples were allowed to soak for 12 hours. A settling cyliner was then thoroughly mixed, returned to vertical position and 25 ml aliquots withdrawn at specified times and depths. The aliquots were placed in a tared 50 ml beaker which was covered and dried in an oven at 90°C. The beakers were reweighed after cool ing for one hour.

APPENDIX B

HYDROGRAPHY DATA

June 1982						
Transect	Contour (m)	Depth (m)	Temperature (°C)	Salinity (0/00)	Conductivity (m(s)/cm)	Sigma-T (G/cc)
1	20	0	6.0		31.61	
1	20	17	5.8		31.46	
1	30	0	5.9		31.51	
1	30	24	5.8		31.48	
2	30	0	6.4		31.80	
2	30	25	6.3		31.83	
3	30	0	6.5		31.83	
3	30	21	6.0		31.50	
3	50	0	6.3		31.59	
3	50	36	5.7		31.29	
4	30	0	6.8		32.14	
4	30	30	6.8		32.14	
4	50	0	5.7		31.20	
4	50	49	5.0		31.70	
6	20	0	7.5		32.75	
6	20	18	7.1		32.42	
7	30	0	10.3		34.83	
7	30	31	9.5		34.38	
7	50	0	9.1		34.18	
7	50	51	7.1		32.59	
8	30	0	9.8		34.35	
8	30	32	9.1		33.96	
8	50	0	9.4		34.39	
8	50	48	8.4		33.62	
9	30	0	9.3		33.99	
9	30	26	9.1		33.81	
9	30	0	9.7		34.28	
9	30	26	9.2		33.94	
9	50	0	9.1		33.93	
9	50	44	8.0		33.08	
9	60	0	9.1		34.08	
9	60	53	7.4		32.69	
10	20	0	9.3		33* 35	
10	20	22	9.3		33.35	
10	30	0	9.2		33.52	
10	30	26	9.2		33.52	
10	50	0	8.6		33.33	
10	50	50	7.2		32.10	

APPENDIX B

(continued)

August 1982						
Transect	Contour (m)	Depth (m)	Temperature (°C)	Salinity (0/00)	Conductivity (m(s)/cm)	Sigma-T (G/cc)
1	20	0	7.9		33.16	
1	20	16	7.7		33.06	
1	30	0	7.9		33.15	
1	30	25	7.6		33.05	
1	50	0	8.3		33.37	
1	50	44	7.5		32.95	
1	60	0	8.5		33.54	
1	60	54	7.3		32.89	
2	60	0	8.4		33.67	
2	60	58	6.9		32.68	
3	60	0	8.8		34.10	
3	60	58	6*6		32.33	
3	60	0	8.9		34.14	
3	60	58	6.5		32.19	
4	20	0	9.6		34.38	
4	20	15	9.6		34.36	
4	50	0	8.9		34.03	
4	50	35	8.5		33.78	
4	50	0	9.0		34*04	
4	50	36	8.9		34.03	
6	20	0	9.9		34.62	
6	20	16	9.9		34.61	
6	30	0	9.3		34.25	
6	30	32	8.9		34.01	
6	50	0	9.3		34.31	
6	50	44	7.8		33.16	
7	30	0	10.3		34.83	
7	30	31	9.5		34.38	
7	50	0	9.1		34.18	
7	50	51	7.1		32.59	
7	60	o	9*0		34.02	
7	60	58	6.9		32.44	
8	30	0	9.8		34 .35	
8	30	32	9.1		33.96	
8	50	0	9.4		34.39	
8	50	48	8.4		33.62	
8	60	0	9.1		34.23	
8	60	56	6.4		32.02	

APPENDIX B

(continued)

August 1982 (continued)

Transect	Contour (m)	Depth (m)	Temperature (°C)	Salinity (0/00)	Conductivity (m(s)/cm)	Sigma-T (G/cc)
9	30	0	9.3		33.99	
9	30	26	9.1		33.81	
9	30	0	9.7		34.28	
9	30	26	9.2		33.94	
9	50	0	9.1		33.93	
9	50	44	8.0		33.08	
9	60	0	9.1		34.08	
9	60	53	7.4		32.69	
10	20	0	9.3		33.35	
10	20	22	9.3		33.35	
10	30	0	9.2		33.52	
10	30	26	9.2		33.52	
10	50	0	8.6		33.33	
10	50	50	7.2		32.10	

October 1982

Transect	Contour (m)	Depth (m)	Temperature (°C)	Salinity (o/oo)	Conductivity (m(s)/cm)	Sigma-T (G/cc)
1	60	0	6.9	31.94	32.38	25.092
1	60	59	6.9	31.96	32.44	25.112
1	60	0	6.9	31.95	32.39	25.104
1	60	59	6.9	31.96	32.44	25.112
2	10	0	6.6	31.69	31.95	24.927
2	10	29	6.6	31.70	31.96	24.936
2	30	0	6.8	31.80	32.21	24.996
2	30	35	6.8	31.81	32.22	24.998
2	50	0	6.8	32.05	32.42	25.192
2	50	50	6.8	32.08	32.45	25.212
2	60	0	6.8	32.10	32.49	25.222
2	60	62	6.7	32.22	32.55	25.332
3	20	0	6.8	31.74	32.15	24.940
3	20	15	6.8	31.72	32.15	24.928
3	30	0	6.9	31.76	32.20	24.951
3	30	27	6.9	31.76	32.22	24.953
3	50	0	6.9	32.07	32.56	25.190

APPENDIX B

(continued)

October 1982 (continued)						
Transect	Contour (m)	Depth (m)	Temperature (°C)	Salinity (0/00)	Conductivity (m(s)/cm)	Sigma-T (G/cc)
3	50	45	6.9	32.07	32.57	25.186
3	60	0	6.9	32.05	32.52	25.179
3	60	59	6.9	32.06	32.56	24.184
4	20	0	6.3	31.35	31.36	24.698
4	20	15	6.6	31.49	31.72	24.772
4	50	0	7.0	32.02	32.54	25.145
4	50	0	7.0	32.02	32.54	25.145
4	50	48	7.0	32.05	32.58	25.171
4	60	0	7.0	32.11	32.60	25.216
4	60	61	7.0	32.10	32.62	25.210
6	20	0	6.9	31.46	31.91	24.725
6	20	18	6.9	31.51	31.97	24.760
6	30	0	7.0	31.63	32.19	24.836
6	30	28	7.0	31.65	32.21	24.852
6	50	0	7*O	32.02	32.58	25.136
6	50	48	7.1	32.03	32.63	25.147
6	60	0	6.9	32.13	32.61	25.236
6	60	58	5*9	32.12	32.62	25.232
7	30	0	6.7	31.25	31.56	24.575
7	30.	24	6.7	31.36	31.72	24.656
7	50	0	6.9	32.01	32.49	25.142
7	50	55	6.9	32.01	32.45	25.148
7	60	0	7.4	31.73	32.60	24.872
7	60	59	7.4	31.72	32.63	24.861
9	30	0	6.7	31.32	31.70	24.621
9	30	19	6.7	31.32	31.71	24.626
9	50	0	7.0	31.79	32.32	24.967
9	50	44	7.0	31.80	32.34	24.971
9	60	0	7.4	31.82	32.75	24.934
9	60	57	7.4	31.82	32.75	24.935
10	20	0	6.7	31.24	31.63	24.562
10	20	21	6.7	31.28	31.67	24.587
10	20	0	6.6	30.85	31.20	24.266
10	20	20	6.7	30.87	31.24	24.277
10	30	0	7.0	31.52	32.07	24.754
10	30	26	7.0	31.52	32.08	24.751
10	30	0	6.7	30.77	31.15	24.194
10	30	20	6.7	30.76	31.15	24.190

APPENDIX B

(continued)

October 1982 (continued)						
Transect	Contour (m)	Depth (m)	Temperature (°C)	Salinity (0/00)	Conductivity (m(s)/cm)	Sigma-T (G/cc)
10	50	0	7.3	31.76	32.57	24.902
10	50	47	7.3	31.76	32.59	24.902
11	30	0	7.0	31.05	31.65	24.381
11	30	24	7.0	31.05	31.67	24.383
11	50	0	7.6	31.67	32.75	24.791
11	50	46	7.6	31.69	32.79	24.806

- = Values not determined

APPENDIX C

TAXONOMIC LIST OF ORGANISMS IDENTIFIED

Organisms	Infaunal Grabs	Epi faunal Trawls
CHLOROPHYTA		
PHAEOPHYTA		
Unidentified species		*
Laminariaceae		
Laminaria sp.		*
Alariaceae		
Alaria sp.		*
Fucaceae		
Fucus sp.		*
RHODOPHYTA		
Unidentified sp.		*
ANTHOPHYTA		
Zosteraceae		
Zostera marina drift		*
PORIFERA		
Grantiidae		
Grantia sp.		*
Demospongia		
Myxillidae		
Mvxilla sp.		*
Myxilla incrustans		*
Demospongia halichondrina		*
Halichondridae		
Halichondria sp.		*
Halichondria panicea		*
Suberitidae		
Suberites ficus		*
Suberites concinnus		*
Isodictya quatsinoensis		*
CNIDARIA		
Hydrozoa		
Bougainvilliidae		
Pandea sp. 1	*	
Hydractinia sp. 1	*	
Tubulariidae		
Tubularia sp. 1	*	
Campanulariidae		
Campanularia sp.	*	
bells dichotoma	*	
Obelia dubia	*	
Lafoeidae		

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Campanulinidae		
Tima sp.	*	
Sertulariidae		
Sertularella gigantea	*	
Sertularella tricuspidata	*	
Sertularia variabilis	*	
Abietinaria sp.	*	
Abietinaria variabilis	*	
Abietinaria nr. *urceolus*	*	
Abietinaria turgida	*	
bietinaria sp. 1	*	*
Thuiaria cedrina	*	
Thuiaria cylindrica	*	*
Haleciidae		
Halecium sp.	*	
Halecium wilsoni	*	
Halecium sp. 1	*	
Halecium Sp. 2	*	
Anthozoa		
Zooantharia actiniaria		
Anemone sp. 14	*	
Anemone sp. 15	*	
Anemone sq. 16	*	*
Anemone sp. 17	*	
Anemone sp. 18	*	
Anemone sp. 19	*	
Anemone sp. 20	*	
Anemone sp. 21	*	
Actinostolidae		
Stomphia sp., juvenile	*	
Stomphia sp.	*	
Metrididae		
Metridium senile	*	
PLATYHELMINTHES	*	
NEMERTINEA	*	
NEMATODA		
ANNELIDA		
Polynoidae		
Unidentified sp.		*
Arcteobia anticostiensis	*	

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Eunoe cirrosa	*	
Harmothoe extenuata	*	
Harmothoe multisetosa	*	*
Lepidonotus squamatus	*	
Sigalionidae		
Pholoe minuta	*	*
Sigalion sp.	*	
Pisionidae	*	
Pisione sp.	*	
Phyllodocidae		
Unidentified sp.		*
Phyllodocidae, juvenile	*	
Anaitides groenlandica	*	
Anaitides mucosa	*	
Anaitides sp.	*	
Phyllodoce sp.	*	
Eteone sp.	*	
Eteone longa	*	
Eulalia sp.	*	
Mysta sp.	*	
Mysta barbata	*	
Hesionura sp.	*	
Hesionidae		
Hesionidae, juvenile	*	*
Syllidae		
Unidentified sp.		*
Autolytus sp.	*	*
Typosyllis sp.	*	*
Eusyllis blomstrandi	*	
Exogone sp.	*	
Sphaerosyllis sp.	*	
Brania sp.	*	
Nereidae		
Unidentified sp.		*
Nereis sp.	*	
Nephtyidae		
Nephtys sp.	*	
Nephtys ciliata	*	
Nephtys caeca	*	

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Nepthys rickettsii	*	
Nephtys longosetosa	*	
Nephtys ferruginea	*	
Sphaerodoridae		
Sphaerodoropsis minuta	*	
Glyceride		
Glycera sp.	*	
Glycera capitata	*	
Goniadidae		
Glycinde picta	*	
Glycinde armigera	*	
Onuphidae		
Onuphis iridescent	*	
Lumbrineridae		
Lumbrineris sp.	*	
Lumbrineris bicirrata	*	
Dorvilleidae		
Protodorvillea sp.	*	
Ophryotrocha sp.	*	*
Schistomeringos caeca	*	
Schistomeringos annulata	*	
Orbiniidae		
Scoloplos armiger	*	
Scoloplos armeceps	*	
Paraonidae		
Aricidea nr. suecica	*	
Aricidea lopezi lopezi	*	
Aricedea sp. a	*	
Paraonella platybranchia	*	
Apistobranchus tullbergi	*	
Spionidae		
Spionidae gen Nova	*	
Polydora sp.	*	
Polydora socialis	*	
Polydora caulleryi	*	
Gattyana	*	
Prionospio steenstrupi	*	
Spio sp.	*	
Spio nr. filicornis	*	
Spiophanes sp.	*	

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Spiophanes bombyx	*	
Spiophanes berkeleyorum	*	
Scolelepis squamata	*	
Minuspio cirrifera	*	*
Magelonidae		
Magelona nr. cerae	*	
Magelona sacculata	*	
Chaetopteridae		
Chaetopterus variopedatus	*	
Spiochaetopterus sp.	*	
Spiochaetopterus costarum	*	
Cirratulidae		
Cirratulus sp.	*	*
harvx sp.	*	
Chaetozone setosa	*	
Flabelligeridae		
Brada villosa	*	
Pherusa sp.	*	
Pherusa pl umosa	*	
Opheliidae		
Armandia brevis	*	
Ophelia sp.	*	
Ophelia limacina	*	
Travisia sp.	*	
Travisia forbesii	*	
Travisia pupa	*	
Ophelina breviata	*	
Capitellidae		
Capitella capitata	*	
Notomastus lineatus	*	
Mediomastus californiensis	*	
Decamastus gracilis	*	
Barontolla sp.	*	
Maldanidae		
Praxillella sp.	*	
hodine birorquata	*	
Oweniidae		
Owenia fusiformis	*	

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Myriochele sp.	*	
Myriochele oculata	*	
Pectinariidae		
Cistenides granulata	*	
Ampharetidae		
Ampharete sp.	*	
Ampharete goesi	*	
Amphare cf acutifrons	*	
Asabellides sibirica	*	
Terebellidae		
Leaena abranchiata	*	
Nicolea zostericola	*	
Pista cri stata	*	
Polycirrus sp.	*	
Lanassa venusta venusta	*	
Laphania boecki	*	
Proclea graffii	*	
Sabellidae		
Chone sp.	*	
Chone gracilis	*	
Chone magna	*	
Euchone sp.	*	
Euchone analis	*	
Euchone hancocki	*	
Euchone arenae	*	
Potamilla reniformis	*	
Sabella media	*	
Serpulidae		
Polygordius sp.	*	
Oligochaeta		
Hirudinea		
MOLLUSCA		
Gastropoda		
Acmaediae		
Collisella sp. 1		*
Lepeta sp. 1	*	
Trochidae		
Margarites cf. helicinus	*	*
Margarites pupillus		*
Margarites costalis	*	*

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Mesogastropoda		
Littorina sp.	*	
Tachyrhynchus erosus	*	
Trichotropidae		
Tichotropis insignis		*
Tichotropis cancellata	*	*
Lamellariidae		
Marsenia cf. rhombica	*	
Velutina laevigata		*
Naticidae eggs”		*
Natica clausa	*	*
Polinices pallida		*
Polinices sp.	*	*
Cymatiidae		
Fusitriton oregonensis		*
Neogastropoda stenoglossa		
Muricidae		
Nucella sp.		
Nucella lamellosa		*
Nucella lima		*
Boreotrophor clathratus		
Buccinidae		
Neptuneidae		
Beringius beringi		*
Liomesus nux		*
Neptunea lyrata		*
Volutopsius castaneus		
Turridae		
Turridae, juvenile		
Suavodrillia kennicottii		
Mangelia? sp. a		
Oenopota cf. turricula		
Oenopota arctica		
Oenopota cf. arctica		
Oenopota sp. a		
Kurtsiella plumbae		
Turridae sp. a		
Odostomia sp.		
Turbonilla sp.		

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Cephalaspidea	*	
Cylichna sp.	*	
Cylichna alba	*	
Scaphander sp. 1	*	
hiline sp. 1	*	
Philine sp. 2	*	
Diaphana minuta	*	
Haminoea sp. 1	*	
Retusa sp. 1	*	
Retusa sp. 2	*	
Nudibranchia		
Neaeromya compressa	*	*
Polyplacophora		
Mopaliidae		
Mopalia hindsi		*
Bivalvia		
Nuculidae		
Nucula tenuis	*	
Nuculana sp.	*	
Nuculana cf. *pernula*	*	
Yoldia cf. *hyperborea*	*	
m myalis	*	
Yoldia 'rata	*	
Mytilidae	*	*
Mytilus edulis	*	
Megacrenella columbiana	*	
Musculus sp., juvenile	*	
Musculus niger	*	
Musculus cf. *discors*	*	
Modiolus sp.	*	
Pterioida pteriina	*	
Anomiidae		*
Pododesmus sp.	*	
Lima sp.	*	
Limatula sp.	*	
Limatula subauriculata	*	
Limatula cf. *attenuata*	*	
Pterioida ostreina	*	

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Ostreidae		*
Ostrea lurida	*	
Axinopsida serricata	*	
Diplodonta cf. impo	*	
Cyclocardia sp.	*	*
Kelliidae		
Pseudopythina compressa		*
Mysella cf. tumida	*	
Carditidae		
Cyclocardia crebricostata	*	
Cyclocardia incisa		
Cyclocardia crassidens	*	*
Astartidae		
Astarte sp., juvenile	*	*
Astarte rollandi	*	*
Astarte cf. vernicosa	*	
Cardiidae		
Clinocardium sp., juvenile	*	
Serripes groenlandicus	*	*
Mactridae		
Spisula sp.	*	*
Mactra alaskana	*	
Mactra nasuata	*	
Solenidae		
Siliqua patula	*	*
Tellinidae		
Macoma sp.	*	*
Macoma moesta	*	
Macoma moesta alaskana	*	
Macoma crassula	*	
Macoma lama	*	
Macoma cf. balthica	*	
Macoma balthica	*	
Macoma cf. calcarea	*	
Macoma sp. a	*	
Tellina lutea		*
Tellina nuculoides	*	
Tellina sp.	*	

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Veneridae		
Saxidomus gigantea	*	*
Psephidia lordi	*	
Humilaria kennerlYi	*	
Patinopecten cauirus	*	
Mya sp.	*	
Hiatellidae	*	
Hiatella arctica	*	
Lyonsia californica	*	
Thracia sp.	*	
Thracia cf. beringi	*	
ANTHROPODA PYCNOGONIDAE		
Pycnogonidae	*	
Crustacea		
Ostracoda		
Calanoida		
Caligus sp.	*	
Cirripedia		
Thoracica		
Balanidae		
Balanus sp.		*
Balanus balanus		*
Balanus crenatus		*
Balanus rostratus		*
Solidobalanus hesperius		*
Mysidacea		
Pacifacanthomysis nephrophthalmia	*	
Xenacanthomysis pseudomacropsis	*	
Mysidae		
Acanthomysis sp.	*	
Acanthomysis pseudomacropsis		*
Acanthomysis sculpts		*
Archaeomysis grebnitzkii		*
Neomysis kadiakensis		*
Cumacea		
Lampropidae		
Lamprops fasciata	*	

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Lamprops carinata	*	
Lamprops? carinata	*	
Lamprops quadriplicata	*	
Lamprops pumilo	*	
Hemilamprops californica	*	
Leuconidae		
Leucon nasica	*	
Eudorellopsis deformis	*	
Diastylidae		
Diastylis alaskensis	*	
Diastylis bidentata	*	
Campylaspidae		
Campylaspis crisps	*	
Tanaidacea		
Paratanaidae		
Leptognathia gracilis	*	
Isopoda		
Anthuridae		
Idoteidae		
Synidotea nodulosa	*	
Munnidae		
Munna stephenseni	*	
Pleurogonium sp.	*	
Amphipoda		
Acanthonotozomataidae		
Odius carinatus	*	
Ampelisc i dae		
Ampelisca macrocephala	*	
Byblis gaimardi	*	
Argissidae		
Argissa hamatipes	*	
Atylidae		
Atylus collingi	*	
Calliopljdae		
Apherusa sp.	*	
Corophiidae		
Corophium crassicome	*	
Ericthonius grebnitzkii	*	
Dexaminidae		
Guernea nordenskioldi	*	

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Eusiridae		
Pontogeneia sp.	*	
Pontogeneia sp. 1	*	
Pontogeneia sp. 2	*	
Pontogeneia sp. 3	*	
Pontogeneia sp. 4	*	
Pontogeneia sp. 5	*	
Pontogeneia sp. S	*	
Gammaridae		
Anisogammarus pugettensis	*	
Maera loveni	*	
Melita dentata	*	
Melita oregonensis	*	
Haustoriidae		
Eohaustorius sawyeri	*	
Isaeidae		
Photis spasskii	*	
Protomedeia cf. penates	*	
Protomedeia cf. fasciata	*	
Protomedeia sp. 1	*	
Protomedeia sp. 2	*	
Gammaropsis sp. 1	*	
Gammaropsis sp. 2	*	
Gammaropsis sp. 3	*	
Gammaropsis sp. 4	*	
Gammaropsis sp. 5	*	
Ischyroceridae		
Ischyrocerus sp.	*	
Lysianassidae		
Anonyx nugax	*	
Anonyx liljeborgi	*	
Hipponedon propinguus	*	
Orchomene minuta	*	
Orchomene pacifica	*	
Wecomedon similis	*	
Oedicerotidae		
Bathymedon ivanovi	*	
Bathymedon sp. 1	*	
Bathymedon sp. 2	*	
Monoculodes castalskii	*	

Organisms	Infaunal Grabs	Epifaunal Trawls
Mallotus villosus		*
Osmerus mordax		*
Allosmerus elongatus		*
Gadidae		
Gaddidae, juvenile		*
Gadus macrocephalus		*
Gadus macrocephalus, juvenile		*
Microgadus proximus		*
Microgadus proximus, juvenile		*
Theragra chalcogramma		*
Theragra chalcogramma, juvenile		*
Zoarcidae		
Gnathostomata II		
Scomberesocidae		
Cololabis saira		*
Gasterosteidae		
Gastertosteus aculeatus		*
Syngrathidae		
Syngnathus griseolineatus		*
Hexagrammidae		
Hexagrammos lagocephalus		*
Hexagrammos octogrammus		*
Hexagrammos stelleri		*
Ophiodon elongatus		*
Hexagrammid Type A		
Anoplopomatidae		
Anoplopoma fimbria		*
Cottidae		
Artedius fenestralis		*
Enophrys bison		*
Gymnocanthus sp.		*
Gymnocanthus sp. ?		*
Gymnocanthus pistilliger		*
Hemilepidotus himilepidotus		*
Hemilepodotus jordani		*
Leptocottus armatus		*
Myoxocephalus sp.		*
Myoxocephalus polyacanthocephalus		*
Oligocottus maculosus		*

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Monoculodes spinipes	*	
Synchelidium sp.	*	
Westwoodilla sp. 1	*	
Oedicerotid sp. 7	*	
Phoxocephalidae		
Harpiniopsis sp.	*	
Harpinopsis qurjanovac	*	
hepoxynius sp.	*	
Foxiphalus alenti	*	
Grandifoxus acanthinus	*	
Grandifoxus aciculata	*	
Grandifoxus lindbergi	*	
Grandifoxus longirostris	*	
Grandifoxus vulpinus	*	
Pleustidae		
Pleustes behningi	*	
Pleustes pandplus	*	
leusymtes sp. 1	*	
Pleusymtes sp. 2	*	
leusymtes sp. 3	*	
Podoceridae		
Dulichia sp.	*	
Stenothoidae		
Metopella sp.	*	
Synopiidae		
Tiron biocellata	*	
Caprelli dae		
Caprella drepanochir	*	
Caprel 1 a gracilior	*	
Decapoda		
Hippolyidae		
Heptacarpus paludecola	*	
Pandalidae		
Pandalus sp.	*	
Pandalus goniurus		*
Pandalus tridens		*
Pandalus stenolepis		*
Pandalopsis aleutica		*
Crangonidae		*
Crangon sp.		*

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Crangon alaskensis		*
Crangon stylirostris		*
Crangon dalli		*
Sclerocrangon boreas		*
Argis crassa		*
Anomura		*
Paguridae	*	
Pagurus ochotensis		*
Pagurus aleuticus		*
Pagurus aleuticus?		*
Pagurus capillatus		*
Pagurus kennerlyi		*
Pagurus beringanus		*
Pagurus confragosus		*
Pagurus trigonocheirus		*
Pagurus capillatus kennerlyi		*
Pagurus sp.		*
Elassochirus tenuimanus		*
Elassochirus gilli		*
Lithodidae		
Paralithodes camtschatica		
Brachyura	*	
Majidae	*	
Orogonia gracilis		*
Hyas lyratus		*
Chionoecetes opilio		*
hionoecetes bairdi		*
Pugettia gracilis		*
Atelecyclidae		
Telmessus cheiragonus		*
Cancridae		
Cancer branneri		*
Cancer magister		*
Cancer oregonensis		*
Pinnotheridae		
SIPUNCULA	*	
PHORONIDA		

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
ECTOPROCTA		
New Bryozoa genus		
Alcyonidiidae		
Alcyonidium proboscideum	*	*
Flustrellidridae		
Flustrella gigantea		*
Lichenoporidae		
Lichenopora sp.		*
Scrupariidae		
Scruparia ambigua		*
Flustridae		
Carbasea carbasea		*
Flustra serrulata		*
Flustra carbasea		*
Calloporidae		
Bidenkapia spitsbergensis alaskensis		*
Tegella sp.		
Calpensiidae		
Microporina articulate		*
Bugulidae		
Dendrobeania murrayana		*
Dendrobeania pseudolevinseni		*
Dendrobeania? orientalism		*
Dendrobeania pseuomurrayana		*
Dendrobeania levinseni		*
Scrupocellariidae		
Tricellaria sp.		*
Mucronellidae		
Cystisella saccata		*
Reteporidae		
Rhynchozoon sp.		*
Celleporidae		
Celleporina? hyalina		*
Celleporina sp.		*
Myriozoidae		
Myriozoella plana		*
Smittinid cf. tegella		*
Pentapora foliacea		*
Cryptoarachnidium sp.		*

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
ECHINODERMATA		
Asteroidea		
Solasteridae		
Solaster endeca		*
Solaster papossus		*
Pteraster sp.		*
Echinasteridae		
Henricia leviuscula		*
Asteriidae		
Asterias amurensis	*	*
Evasterias troschelii		*
Leptasterias coei		*
Leptasterias groenlandica		*
Stylasterias sp.		*
Pycnopodia helianthoides		*
Ophiuroidea	*	
Ophiuridae		
Ophiura sarsi		*
Ophiactidae		
Ophiopholis aculeata var. kenneryli		*
Amphiuridae		
Amphoidia digitata		*
Amphipholis squamata		*
Echinoidea		
Echinoidea echinoida		*
Strongylocentroti dae		
Strongylocentrotus droebachiensis	*	*
Dendrasteridae		
Dendraster excentricus	*	*
Spatangidae	*	
Holothuroida		
Phyllophoridae		
Havelockia sp. 2	*	
Cucumariidae		
Cucumaria fallax		*
Eupentacta quinquesemita	*	*
Pentamera calcigera	*	
Pentamera lissoplaca	*	*

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Pentamera sp. b	*	
Thyone sp.	*	
Chiridotidae	*	
Chiridota sp.	*	
Myriotrochidae	*	
CHORDATA	*	
Hemichordata	*	
Urochordata	*	
Ascidiacea		
Ascidiacea, solitary?		*
Ascidiacea, compond?		*
Clavelinidae		
Distaplia sp.	*	*
Archidistoma sp.		*
Polyclinidae		
Synoicum jordani		*
Aplidiopsis pannosum		*
Polyclinum sp.		*
Aplidium sp.		*
Agnesiidae "		
Agnesia septentrionalis	*	*
Ascidiacea pleurogona stolidobranchiata		*
Styelidae		
Dendrodoa aggregata		*
Styela? coriacea	*	*
Pyuridae		
Boltenia ovifera		*
Halocynthia aurantium	*	*
Batoidimorpha		
Rajidae		
Raja abyssicola		*
Raja binoculata		*
Osteichthyes		
Clupeidae		
Clupea harengus pallasi		*
Protacanthopterygii salmoniformes		*
Osmeridae		

APPENDIX C

(continued)

Organisms	Infaunal Grabs	Epifaunal Trawls
Radulinus asprellus		*
Triglops pingeli		*
Agonidae		
'Aspidophoroides bartoni		*
Agonus acipenserinus		*
Occella dodecaedron		*
Pallasina barbata		*
Cyclopteridae		
Liparis sp.		*
Liparis dennyi		*
Liparis pulchellus		*
Liparis sp. 1		*
Liparis sp. 2		*
Trichodontidae		
Trichodon trichodon		*
Stichaeidae		
Anoplarchus sp.		*
Lumpenus sagitta		*
Pholidae		
Pholis laeta		*
Ammodytidae		
Ammodytes hexapterus	*	*
Pleuronectidae		
Pleuronectidae, juvenile		*
Atheresthes stomias		*
Eopsetta jordani		*
Hippoglossoides elassodon		*
Isopsetta isolepis		*
Lepidopsetta bilineata		*
Lepidopsetta bilineata, juvenile		*
Limanda aspera		*
Limanda aspera, juvenile		*
Limanda proboscidea		*
Platichthys stellatus		*
Pleuronectes quadrituberculatus		*
Hippoglossus stenolepis		*

APPENDIX D

RAW DATA FROM INFAUNAL SAMPLES

SAMPLES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	04
TRANSECT	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02
DEPTH	10	10	10	10	10	30	30	30	30	30	50	50	50	50	50
REPLICATE	1	2	3	4	5	1	2	3	4	6	1	2	3	4	5
SPECIES															
1. CNIDARIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. PANDEA SP. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3* TIMA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. ANTHOZOA	0	0	0	0	0	2	3	1	0	3	8	9	18	11	4
5. PLATYHELMINTHES	0	0	0	0	0	1	1	7	0	0	0	0	0	0	0
6. NEMERTINEA	0	1	0	0	0	43	3	15	3	2	0	1	1	6	3
7* NEMATODA	0	3	1	1	0	45	2	4	5	2	1	1	2	0	0
8. POLYCHAETA	0	0	2	0	0	5	1	1	0	0	0	0	0	0	0
9. POLYNOIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10. ARCTEOBIA ANTICOSTIENSIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11* EUNOE CIRROSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12. HARMOTHOE EXTENUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13* HARMOTHOE MULTISETOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14* LEPIDONOTUS SQUAMATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15. SIGALIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. PHOLOE MINUTA	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0
17* SIGALION SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18. PISIONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19. PHYLLODOCIDAE	0	0	0	0	0	2	1	0	0	0	0	0	1	0	0
20. ANAITIDES GROENLANDICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21. ANAITIDES MUCOSA	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
22. ANAITIDES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23. ETEONE SP.	0	0	0	0	1	B	0	0	0	1	0	0	0	0	0
24. ETEONE LONGA	0	0	1	4	2	66	15	21	6	4	0	2	2	2	1
25. EULALIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26. MYSTA SP.	1	1	0	0	0	0	0	1	0	0	0	0	0	0	2
27. MYSTA BARBATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28. HESIONURA SP.	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0
29. HESIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30. HESIONIDAE, JUV.	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
31. SYLLIDAE	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0
32. AUTOLYTUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33. TYPOSYLLIS SP.	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0
34. EUSYLLIS BLOMSTRANDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35. EXOGONE SP.	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
36. SPHAEROSYLLIS SP.	0	0	0	0	0	1	0	3	0	0	0	0	5	0	0
37. BRANIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38. NEREIDAE	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
39* NEREIS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40. NEPHTYS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41* NEPHTYS CILIATA	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
42. NEPHTYS CAECA	1	0	0	2	2	0	0	0	0	1	0	0	2	1	0
43. NEPHTYS RICKETTSII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44. NEPHTYS LONGOSETOSA	4	1	1	12	3	0	0	0	0	0	0	0	0	0	0
45. NEPHTYS FERRUGINEA	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
46. SPHAERODOROPSIS MINUTA	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
47. GLYCERA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48. GLYCERA CAPITATA	0	0	0	0	0	2	2	4	2	0	0	1	1	1	3

APPENDIX D

(continued)

SPECIES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	04	06	06
TRANSECT	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02
DEPTH	10	10	10	10	10	30	30	30	30	30	50	50	50	50	50
REPLICATE	1	2	3	4	5	1	2	3	4	6	1	2	3	4	5
49. GONIADIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50. GLYCINDE PICTA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
51. GLYCINDE ARMIGERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52. ONUPHIS IRIDESCENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53. LUMBRINERIS SP.	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
540 LUMBRINERIS BICIRRATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55. DORVILLEIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56. PROTODORVILLEA SP.	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
57. OPHRYOTROCHA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58. SCHISTOMERINGOS CAECA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59. SCHISTOMERINGOS ANNULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60. SCOLOPLOS ARMIGER	2	7	0	12	6	0	0	2	0	0	0	0	0	2	0
61. SCOLOPLOS ARMECEPS	0	0	0	0	0	2	4	4	0	0	0	0	0	0	0
62. PARAONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63. ARICIDEA NR. SUECICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64. ARICIDEA LOPEZI LOPEZI	0	0	0	0	0	16	0	1	0	0	0	1	0	0	0
65. ARICEDEA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66. PARAONELLA PLATYBRANCHIA	2	0	0	5	0	0	0	1	0	0	0	0	0	0	0
67, APISTOBRANCHUS TULLBERGI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68. SPIONIDAE	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
69. SPIONIDAE GEN NOV	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
70. POLYDORA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71. POLYDORA SOCIALIS	0	0	0	5	0	0	0	0	1	0	0	0	0	0	0
72. POLYDORA CAULLERYI	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
73. GATTYANA CIRROSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74. PRIONOSPIO STEENSTRUPI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75. SPIO SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76. SPIO NR FILICORNIS	0	0	1	0	7	0	0	0	0	0	1	0	0	0	1
77. SPIOPHANES? SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78, SPIOPHANES BOMBYX	40	0	0	163	225	1	0	0	0	1	5	2	13	10	4
79. SPIOPHANES BERKELEYORUM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
80. SCOLELEPIS SQUAMATA	15	53	1	7	3	0	0	0	0	0	0	0	0	0	0
81. MINUSPIO CIRRIFERA	0	0	0	0	0	7	0	2	0	0	0	0	0	0	0
82. MAGELONA NR CERAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83. MAGELONA SACCULATA	7	0	0	11	1	0	0	0	0	0	0	0	0	0	0
84. CHAETOPTERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85. CHAETOPTERUS VARIOPEDATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
86. SPIOCHAETOPTERUS SP',	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87. SPIOCHAETOPTERUS COSTARUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
88. CIRRATULIDAE	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
89. CIRRATULUS SP.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
90. THARYX SP'.	0	0	0	0	0	7	1	3	1	0	0	0	0	0	0
91. CHAETOZONE SETOSA	112	0	0	304	607	1	0	2	2	0	0	0	1	0	2
92. FLABELLIGERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93. BRADA VILLOSA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
94. PHERUSA SP.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
95. PHERUSA PLUMOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96. ARMANDIA BREVIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97, OPHELIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SPECIES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02
DEPTH	10	10	10	10	10	30	30	30	30	30	50	50	50	50	50
REPLICATE	1	2	3	4	5	1	2	3	4	6	1	2	3	4	5
98. OPHELIA LIMACINA	0	0	0	0	0	0	1	3	1	1	5	3	1	7	4
99. TRAVISIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100. TRAVISIA FORBESII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101. TRAVISIA PUPA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102. OPHELINA BREVIATA	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
103. CAPITELLA CAPITATA	0	0	96	8	22	3	0	0	0	1	0	0	0	0	0
104. NOTOMASTUS LINEATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105. MEDIOMASTUS CALIFORNIENSIS	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
106. DECAMASTUS GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107. BARONTOLLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108, MALDANIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109* PRAXILLELLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110. RHODINE BIRORQUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111. OWENIA FUSIFORMIS	7	0	2	17	39	62	44	62	20	76	1	6	6	5	2
112* MYRIOCHELE SP,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113. MYRIOCHELE OCULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114. PECTINARIIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115. CISTENIDES GRANULATA	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
116, AMPHARETIDAE	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
117. AMPHARETE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
118. AMPHARETE GOESI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
119. AMPHARE CF ACUTIFRONS	0	0	0	1	2	6	3	2	0	1	5	4	17	4	0
120. ASABELLIDES SIBIRICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
121. TEREBELLIDAE	0	0	0	0	0	0	2	0	1	0	0	0	1	0	0
122. LEAENA ABRANCHIATA	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
123. NICOLEA ZOSTERICOLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
124? PISTA CRISTATA	o	0	0	0	0	0	0	0	0	0	1	2	2	3	0
125. POLYCIRRUS SP.	0	0	0	0	0	43	0	1	0	0	0	1	0	0	0
126. LANASSA VENUSTA VENUSTA	o	0	0	0	0	1	0	0	0	1	2	0	5	1	4
127. LAPHANIA BOECKI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128. PROCLEA GRAFFII	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
129. SABELLIDAE	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
130. CHONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
131. CHONE GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132. CHONE MAGNA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133. EUCHONE SP.	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0
134. EUCHONE ANALIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135. EUCHONE HANCOCKI	o	0	0	0	0	23	0	0	0	0	0	0	0	0	0
136. EUCHONE ARENAE	0	0	0	0	0	30	0	37	1	0	2	2	2	1	0
137. POTAMILLA RENIFORMIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
138. SABELLA MEDIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139. SERPULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140. POLYGORDIUS SP.	0	0	0	0	0	6	27	25	3	0	2	0	0	0	1
141. OLIGOCHAETA	4	0	4	1	0	176	46	33	17	12	0	0	5	3	1
142. HIRUDINEA	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0
143. MOLLUSCA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
144, GASTROPODA	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
145. LEPETA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146. MARGARITES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SAMPLES

SPECIES	06 02 10 1	06 02 10 2	06 02 10 3	06 02 10 4	06 02 10 5	06 02 30 1	06 02 30 2	06 02 30 3	06 02 30 4	06 02 30 6	06 02 50 1	06 02 50 2	06 02 50 3	06 02 50 4	06 02 50 5
147. MARGARITES CF. HELICINUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
148. MARGARITES COSTALIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
149. LITTORINA SP.	0	1	39	0	.	0	0	0	0	0	0	0	0	0	0
150. TACHYRHYNCHUS EROSUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
151. TRICHOTROPIS CANCELLATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152. MARSENIA CF. RHOMBICA	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
153. NATICA CLAUSA	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2
154. POLINICES SP.	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
155. TURRIDAE, JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
156. SUAVODRILLIA KENNICOTTII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157. MANGELIA? SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
158. OENOPOTA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159. OENOPOTA CF. TURRICULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160. OENOPOTA CF. ARCTICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
161. OENOPOTA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162. KURTSIELLA PLUMBAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
163. TURRIDAE SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
164. ODOSTOMIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165. TURBONILLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
166. CEPHALASPIDEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
167. CYLICHNA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
168. CYLICHNA ALBA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
169. CYLICHNA? SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170. SCAPHANDER SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
171. PHILINE SP. A	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0
172. PHILINE SP. B	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
173. DIAPHANA MINUTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
174. HAMINOEA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175. RETUSA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
176. RETUSA SP. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177. NUDIBRANCHIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
178. NEAEROMYA COMPRESSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
179. BIVALVIA	0	0	.	0	0	0	0	0	0	0	0	0	0	0	0
180. NUCULA TENUIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
181. NUCULANA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182. NUCULANA CF. PERNULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183. YOLDIA CF. HYPERBOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184. YOLDIA MYALIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
185. YOLDIA SCISSURATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
186. MYTILIDAE	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
187. MEGACRENELLA COLUMBIANA	0	0	0	0	0	0	4	0	.	2	0	5	6	0	2
188. MUSCULUS SP. JUV.	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
189. MUSCULUS NIGER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190. MUSCULUS CF. DISCORS	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
191. MODIOLUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
192. LIMA SP.	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
193. LIMATULA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	.	1
194. LIMATULA SUBAURICULATA	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0
195. LIMATULA CF. ATTENUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

	SAMPLES														
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02
DEPTH	10	10	10	10	10	30	30	30	30	30	50	50	50	50	50
REPLICATE	1	2	3	4	5	1	2	3	4	6	1	2	3	4	5
SPECIES	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
196. AXINOPSIDA SERRICATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
197. DIPLODONTA CF. IMPO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
198. CYCLOCARDIA SP.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
199. MYSELLA CF. TUMIDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200. CYCLOCARDIA CREBRICOSTATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
201. CYCLOCARDIA INCISA	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
202. ASTARTE SP., JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
203. ASTARTE ROLLANDI	0	0	0	0	0	0	26	-	-	9	.	11	50	4	0
204. ASTARTE CF. VERNICOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
205. CLINOCARDIUM SP., JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
206. SERRIPES GROENLANDICUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
207. SPISULA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
208. MACTRA ALASKANA	0	0	0	1	0	0	0	0	0	0	-	0	0	0	0
209. MACTRA NASUATA	1	0	0	0	.	0	0	0	0	0	0	0	0	0	0
210. SILIQUA PATULA	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0
211. MACOMA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
212. MACOMA MOESTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
213. MACOMA MOESTA ALASKANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
214. MACOMA CRASSULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
215. MACOMA LAMA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
216. MACOMA BALTHICA	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0
217. MACOMA CF. BALTHICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
218. MACOMA CF. CALCAREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219. MACOMA SP. A	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0
220. TELLINA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
221. TELLINA NUCULOIDES	0	0	0	0	0	0	4	0	0	0	1	1	3	-	4
222. SAXIDOMUS GIGANTEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
223. PSEPHIDIA LORDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
224. HUMILARIA KENNERLYI	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
225. PATINOPECTEN CAURINUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
226. MYA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
227. HIATELLA ARCTICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
228. LYONSIA CALIFORNICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
229. THRACIA SP. ,	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0
230. DECAPODA	0	0	0	0	0	2	0	0	0		0	0	0	0	0
231. CARIDEA	0	0	0	0	0	0	0			0	0	0	0	0	0
232. PAGURIDAE	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
233. MAJIDAE	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
234. OROGONIA GRACILIS	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
235. CHIONIECETES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
236. CANCRIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
237. PINNOTHERIDAE	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
238. SIPUNCULA	0	0	0	0	0	24 2	70	59	9	0	2	6	16	0	2
239. ALCYONIDIUM SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
240. ASTERIAS AMURENSIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
241. OPHIUROIDEA	0	0	0	0	0	18	1	2	0	0	0	0	0	0	0
242. STRONGYLOCENTROTUS DROEBACHIENSIS	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
243. DENDRASTER EXCENTRICUS	0	1	0	0	0	0	0	0	0		26	27	26	v	71
244. SPATANGIDAE	0	0	0	0	0	0	8	0	3	40	0	0	0	0	0

APPENDIX D

(continued)

	SAMPLES														
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	03	03	03	03	04	04	04	04	04	04	04	04	04	04	04
DEPTH	10	10	30	50	10	10	10	10	10	30	30	30	30	50	50
REPLICATE	1	2	1	1	1	2	3	4	5	1	2	3	4	1	2
SPECIES	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
245. DENDROCHIROTIDA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
246. HOLOTHUROIDEA DENDROCHIROTACEA	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
247. HAVELOCKIA SP. B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
248. THYONINAE A	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
249. EUPENTACTA QUINQUESEMITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250. PENTAMERA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
251. PENTAMERA LISSOPLACA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
252. PENTAMERA SP. B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
253. CHIRIDOTIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
254. CHIRIDOTA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255. MYRIOTRHOCHIDAE	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
256. HEMICHORDATA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
257. UROCHORDATA	0.00	0.00	0.00	0.00	0.00	5.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
258. DISTAPLIA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.0	0.00	0.00	4.00	0.00	0.00
259. AGNESIA SEPTENTRIONALIS	0.00	0.00	0.00	0.00	0.00	366.	95.0	1.00	6.00	0.00	2.00	7.00	0.00	0.00	3.00
260. STYELA ?CORIACEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
261. HALOCYNTHIA AURANTIUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
262. AMMODYTES HEXAPTERUS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
263. NSPECIES	13.[illegible]	9.00	12.0	23.0	18.0	44.0	28.0	32.0	19.0	25.0	25.0	26.0	36.0	21.0	2[illegible].0
264. H	1.4[illegible]	.939	1.[illegible]8	1.53	1.0[illegible]	2.33	2.43	2.57	2.41	2.11	2.53	2.66	2.8	2.72	1.78
265. EVENNESS	0.50	.427	.4[illegible]5	.489	0.34	.617	0.73	0.74	.817	.649	.787	.818	.781	.[illegible]94	.595
266. TOTAB	197	69.0	15[illegible]	579.	925.	1218	408.	320.	84.0	197.	75.0	100.	210.	7[illegible].0	117.

APPENDIX D

(continued)

SAMPLES

	MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
	TRANSECT	03	03	03	03	04	04	04	04	04	04	04	04	04	04	04
	DEPTH	10	10	30	50	10	10	10	10	10	30	30	30	30	50	50
	REPLICATE	1	2	1	1	1	2	3	4	5	1	2	3	4	1	2
SPECIES																
1. CNIDARIA		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2. PANDEA SP. 1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. TIMA SP.		0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4. ANTHOZOA		0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
5. PLATYHELMINTHES		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6. NEMERTINEA		0	1	3	6	0	0	0	0	0	3	1	3	1	12	9
7. NEMATODA		0	0	0	0	0	0	0	0	0	0	0	0	0	2	1
8. POLYCHAETA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9. POLYNOIDAE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10. ARCTEOBIA ANTICOSTIENSIS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11. EUNOE CIRROSA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12. HARMOTHOE EXTENUATA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13, HARMOTHOE MULTISETOSA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14. LEPIDONOTUS SQUAMATUS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15. SIGALIONIDAE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. PHOLOE MINUTA		0	0	8	9	0	0	0	0	0	0	0	0	0	0	0
17. SIGALION SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18. PISIONE SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19. PHYLLODOCIDAE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20. ANAITIDES GROENLANDICA		0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
21. ANAITIDES MUCOSA		0	0	21	0	1	0	0	1	0	0	0	0	0	8	8
22. ANAITIDES SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23. ETEONE SP.		0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
24. ETEONE LONGA		1	15	6	1	4	2	3	2	1	0	0	0	0	3	9
25. EULALIA SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26. MYSTA SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
27. MYSTA BARBATA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28. HESIONURA SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29. HESIONIDAE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30. HESIONIDAE, JUV.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31. SYLLIDAE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32. AUTOLYTUS SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33, TYPOSYLLIS SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
34. EUSYLLIS BLOMSTRANDI		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35. EXOGONE SP.		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
36. SPHAEROSYLLIS SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37. BRANIA SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38. NEREIDAE		0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
39. NEREIS SP.		0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
40, NEPHTYS SP.		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
41. NEPHTYS CILIATA		0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
42. NEPHTYS CAECA		0	0	2	2	2	0	0	0	0	0	0	1	0	2	2
43, NEPHTYS RICKETTSII		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44, NEPHTYS LONGOSETOSA		3	1	17	7	25	9	18	12	11	0	1	2	1	0	0
45. NEPHTYS FERRUGINEA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46. SPHAERODOROPSIS MINUTA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47, GLYCERA SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48. GLYCERA CAPITATA		0	0	0	0	0	0	0	0	0	0	0	0	0	6	6

APPENDIX D

(continued)

SAMPLES

SPECIES	06 03 10 1	06 03 10 2	06 03 30 1	06 03 50 1	06 04 10 1	06 04 10 2	06 04 10 3	06 04 10 4	06 04 10 5	06 04 30 1	06 04 30 2	06 04 30 3	06 04 30 4	06 04 50 1	06 04 50 2
49. GONIADIDAE	o	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50. GLYCINDE PICTA	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0
51. GLYCINDE ARMIGERA	0	0	8	13	1	1	0	0	0	0	0	0	0	0	0
52. ONUPHIS IRIDESCENS	0	0	1	22	0	0	0	0	0	0	0	0	0	0	0
53. LUMBRINERIS SP.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
54. LUMBRINERIS BICIRRATA	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
55. DORVILLEIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56. PROTODORVILLEA SP.,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
57. OPHRYOTROCHA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58. SCHISTOMERINGOS CAECA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59. SCHISTOMERINGOS ANNULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
60. SCOLOPLOS ARMIGER	5	9	20	14	46	16	7?	72	35	1	22	21	11	10	6
61. SCOLOPLOS ARMECEPS	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
62. PARAONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63. ARICIDEA NR. SUECICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64. ARICIDEA LOPEZI LOPEZI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65. ARICEDEA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
66. PARAONELLA PLATYBRANCHIA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
67. APISTOBRANCHUS TULLBERGI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68. SPIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69. SPIONIDAE GEN NOV	10	8	0	0	0	0	1	0	2	0	0	0	0	0	0
70. POLYDORA SP.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
71, POLYDORA SOCIALIS	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1
72. POLYDORA CAULLERYI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73. GATTYANA CIRROSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
74, PRIONOSPIO STEENSTRUPI	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
75. SPIO SP.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
76. SPIO NR FILICORNIS	0	0	14	0	0	0	0	0	0	0	3	1	1	0	3
77, SPIOPHANES? SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78. SPIOPHANES BOMBYX	6	1	106	52	24	8	13	15	1	0	0	0	0	18	19
79. SPIOPHANES BERKELEYORUM	0	0	0	78	0	0	0	0	0	0	0	0	0	0	0
80. SCOLELEPIS SQUAMATA	0	0	27	4	2	4	0	5	0	0	0	0	0	0	0
81. MINUSPIO CIRRIFERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82. MAGELONA NR CERAE	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0
83. MAGELONA SACCULATA	0	0	4	24	11	24	11	29	2	1	0	0	1	0	0
84. CHAETOPTERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85. CHAETOPTERUS VARIOPEDATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
86, SPIOCHAETOPTERUS SP.,	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
87. SPIOCHAETOPTERUS COSTARUM	0	0	0	0	0	0	0	0	0	()	0	0	0	0	0
88. CIRRATULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89. CIRRATULUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90. THARYX SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	3	7
91. CHAETOZONE SETOSA	4	0	6	19	0	1	0	0	0	1	0	0	0	0	0
92. FLABELLIGERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93. BRADA VILLOSA	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
94. PHERUSA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95. PHERUSA PLUMOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96. ARMANDIA BREVIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97. OPHELIA SP.	0	0	0	0	0	()	()	()	()	()	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES	MONTH 06 TRANSECT 03 DEPTH 10 REPLICATE 1	06 03 10 2	06 03 30 1	06 03 50 1	06 04 10 1	06 04 10 2	06 04 10 3	06 04 10 4	06 04 10 5	06 04 30 1	06 04 30 2	06 04 30 3	06 04 30 4	06 04 50 1	06 04 50 2
98. OPHELIA LIMACINA	1	1	1	1	0	0	0	0	1	1	17	8	2	0	0
99. TRAVISIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100. TRAVISIA FORBESII	0	0	0	5	0	0	0	0	0	0	1	1	0	0	0
101. TRAVISIA PUPA	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0
102. OPHELINA BREVIATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103. CAPITELLA CAPITATA	0	0	1	0	1	1	0	0	1	0	0	0	0	0	0
104. NOTOMASTUS LINEATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
105. MEDIOMASTUS CALIFORNIENSIS	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
106. DECAMASTUS GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107. BARONTOLLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108. MALDANIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109. PRAXILLELLA SP.	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0
110. RHODINE BIRORQUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5
111. OWENIA FUSIFORMIS	1	0	1	0	0	0	1	0	0	0	1	1	1	357	453
112. MYRIOCHELE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113. MYRIOCHELE OCULATA	0	0	2	35	0	0	0	0	0	0	1	0	0	0	0
114. PECTINARIIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115. CISTENIDES GRANULATA	0	0	2	0	0	0	0	0	0	0	0	0	0	14	12
116. AMPHARETIDAE	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
117. AMPHARETE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
118. AMPHARETE GOESI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1190 AMPHARE CF ACUTIFRONS	0	0	1	8	0	0	0	0	0	0	0	0	0	14	9
120. ASABELLIDES SIBIRICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
121. TEREBELLIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122. LEAENA ABRANCHIATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
123. NICOLEA ZOSTERICOLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
124. PISTA CRISTATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125. POLYCIRRUS SP.	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
126. LANASSA VENUSTA VENUSTA	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
1270 LAPHANIA BOECKI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128. PROCLEA GRAFFII	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
129. SABELLIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130. CHONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
131. CHONE GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132. CHONE MAGNA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133. EUCHONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
134. EUCHONE ANALIS	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
135. EUCHONE HANCOCKI	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
136. EUCHONE ARENAE	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
137. POTAMILLA RENIFORMIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
138. SABELLA MEDIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139. SERPULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140. POLYGORDIUS SP.	0	0	0	0	0	0	1	0	0	0	0	0	0	9	1
141. OLIGOCHAETA	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
142. HIRUDINEA	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
143. MOLLUSCA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
144. GASTROPODA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145. LEPETA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146. MARGARITES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

	SAMPLES														
MONTH	06	06	06	06	06	06	06	04	06	06	06	06	06	06	06
TRANSECT	03	03	03	03	04	04	04	04	04	04	04	04	04	04	04
DEPTH	10	10	30	50	10	10	10	10	10	30	30	30	30	50	50
REPLICATE	1	2	1	1	1	2	3	4	5	1	2	3	4	1	2
SPECIES															
1470 MARGARITES CF. HELICINUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
148. MARGARITES COSTALIS	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0
149. LITTORINA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150. TACHYRHYNCHUS EROSUS	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
151. TRICHOTROPIS CANCELLATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152. MARSENIA CF. RHOMBICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
153. NATICA CLAUSA	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
154. POLINICES SP.	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0
155. TURRIDAE, JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
156, SUAVODRILLIA KENNICOTTII	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
157. MANGELIA? SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
158. OENOPOTA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159. OENOPOTA CF. TURRICULA	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
160, OENOPOTA CF. ARCTICA	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
161. OENOPOTA SP, A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162, KURTSIELLA PLUMBAE	0	0	3	4	0	0	0	0	0	0	0	0	0	0	0
163. TURRIDAE SP. A	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
164. ODOSTOMIA SP,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165. TURBONILLA SP.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
166. CEPHALASPIDEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
167. CYLICHNA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
168. CYLICHNA ALBA	0	0	5	7	0	0	0	0	0	0	0	0	0	0	0
169. CYLICHNA? SP, A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170, SCAPHANDER SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
171. PHILINE SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
172. PHILINE SP. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
173. DIAPHANA MINUTA	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
174. HAMINOEA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175. RETUSA SP. A	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
176. RETUSA SP. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177. NUDIBRANCHIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
178. NEAEROMYA COMPRESSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
179. BIVALVIA	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180. NUCULA TENUIS	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0
181. NUCULANA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182. NUCULANA CF. PERNULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
183. YOLDIA CF. HYPERBOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184. YOLDIA MYALIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
185. YOLDIA SCISSURATA	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0
186. MYTILIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
187. MEGACRENELLA COLUMBIANA	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
188. MUSCULUS SP. JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
189, MUSCULUS NIGER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190. MUSCULUS CF. DISCORS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
191. MODIOLUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
192, LIMA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
193. LIMATULA SP,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
194. LIMATULA SUBAURICULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
195. LIMATULA CF. ATTENUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	03	03	03	03	04	04	04	04	04	04	04	04	04	04	04
DEPTH	10	10	30	50	10	10	10	10	10	30	30	30	30	50	50
REPLICATE	1	2	1	1	1	2	3	4	5	1	2	3	4	1	2
196. AXINOPSIDA SERRICATA	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
197. DIPLODONTA CF. IMPO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
198. CYCLOCARDIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
199. MYSELLA CF. TUMIDA	0	0	24	3	0	0	0	0	0	0	0	0	0	0	0
200. CYCLOCARDIA CREBRICOSTATA	0	0	0	12	0	0	0	96	0	2	18	4	0	0	0
201. CYCLOCARDIA INCISA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
202. ASTARTE SP., JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
203. ASTARTE ROLLANDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
204. ASTARTE CF. VERNICOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
205. CLINOCARDIUM SP., JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
206. SERRIPES GROENLANDICUS	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
207. SPISULA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
208. MACTRA ALASKANA	0	0	2	7	4	0	0	0	0	0	2	1	0	0	0
209. MACTRA NASUATA	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0
210. SILIQUA PATULA	8	6	7	0	1	1	0	4	3	0	0	0	0	0	0
211. MACOMA SP.	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
212. MACOMA MOESTA	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
213. MACOMA MOESTA ALASKANA	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0
214. MACOMA CRASSULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
215. MACOMA LAMA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
216. MACOMA BALTHICA	0	0	9	0	0	0	0	0	0	0	0	0	0	0	7
217. MACOMA CF. BALTHICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
218. MACOMA CF. CALCAREA	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0
219. MACOMA SP. A	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
220. TELLINA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
221. TELLINA NUCULOIDES	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
222. SAXIDOMUS GIGANTEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
223. PSEPHIDIA LORDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
224. HUMILARIA KENNERLYI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225. PATINOPECTEN CAUIRUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
226. MYA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
227. HIATELLA ARCTICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
228. LYONSIA CALIFORNICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
229. THRACIA SP.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
230. DECAPODA	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
231. CARIDEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
232. PAGURIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
233. MAJIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
234. OROGONIA GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
235. CHIONIECETES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
236. CANCRIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
237. PINNOTHERIDAE	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
238. SIPUNCULA	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
239. ALCYONIDIUM SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
240. ASTERIAS AMURENSIS	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
241. OPHIUROIDEA	0	0	0	2	0	0	0	0	0	0	0	0	0	2	2
242. STRONGYLOCENTROTUS DROEBACHIENSIS	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
243. DENDRASTER EXCENTRICUS	0	0	55	58	0	1	0	0	0	5	5	7	8	1	1
244. SPATANGIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SPECIES								SAMPLES							
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	03	03	03	03	04	04	04	04	04	04	04	04	04	04	04
DEPTH	10	10	30	50	10	10	10	10	10	30	30	30	30	50	50
REPLICATE	1	2	1	1	1	2	3	4	5	1	2	3	4	1	2
	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
245. DENDROCHIROTIDA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
246. HOLOTHUROIDEA DENDROCHIROTACEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00
247. HAVELOCKIA SP. B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
248. THYONINAE A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
249. EUPENTACTA QUINQUESEMITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250. PENTAMERA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
251. PENTAMERA LISSOPLACA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	7.00
252. PENTAMERA SP. B	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.0	3.00
253. CHIRIDOTIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
254. CHIRIDOTA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255. MYRIOTRHOCHIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
256. HEMICHORDATA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.
257. UROCHORDATA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
258. DISTAPLIA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
259. AGNESIA SEPTENTRIONALIS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00
260. STYELA ?CORIACEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
261. HALOCYNTHIA AURANTIUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
262. AMMODYTES HEXAPTERUS	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
263. NSPECIES	[illegible]	11.0	41.0	53.0	4.[illegible]	14.0	11.0	13.0	10.0	11.0	17.0	12.0	[illegible]	33.0	36.0
264. H	2.10	[illegible]	2.75	3.13	[illegible]	1.98	1.33	1.61	1.36	1.86	[illegible]	1.88	1.75	1.49	1.30
265. EVENNESS	.877	[illegible]	.741	.788	.68	0.75	.554	0.63	.589	.777	[illegible]	.758	.759	.426	.364
266. TOTAB	42.0	47.0	389.	479.	[illegible]	72.0	130.	240.	58.0	28.0	78.0	51.0	28.0	505.	595.

APPENDIX D

(continued)

SAMPLES

MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	04	04	04	06	06	06	06	06	06	06	06	07	07	07	07
DEPTH	50	50	50	30	30	30	50	50	50	50	50	10	10	10	10
REPLICATE	3	4	5	1	2	4	1	2	3	4	5	1	2	3	4
SPECIES															
1. CNIDARIA	o	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. PANDEA SP. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. TIMA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4, ANTHOZOA	2	2	1	0	0	0	2	0	0	0	0	0	0	0	0
5. PLATYHELMINTHES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6. NEMERTINEA	4	6	2	2	7	7	4	6	6	2	3	0	0	0	0
7, NEMATODA	0	2	4	0	1	27	1	3	1	0	0	0	1	0	0
8. POLYCHAETA	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
9. POLYNOIDAE	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
10. ARCTEOBIA ANTICOSTIENSIS	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
11. EUNOE CIRROSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12. HARMOTHOE EXTENUATA	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
13. HARMOTHOE MULTISETOSA	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
14. LEPIDONOTUS SQUAMATUS	O	0	0	0	0	0	1	0	0	0	0	0	0	0	0
15. SIGALIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. PHOLOE MINUTA	2	4	3	0	1	19	2	10	7	i	6	1	0	0	0
170 SIGALION SP.	o	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18.PISIONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190 PHYLLODOCIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20. ANAITIDES GROENLANDICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21. ANAITIDES MUCOSA	4	21	11	3	3	3	1	0	0	0	0	0	0	1	0
22, ANAITIDES SP.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
23. ETEONE SP.	0	0	0	1	0	5	0	0	0	0	0	0	0	0	0
24, ETEONE LONGA	1	8	0	1	2	163	0	0	0	0	0	1	0	1	0
25. EULALIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26. MYSTA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27. MYSTA BARBATA	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
28. HESIONURA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29. HESIONIDAE	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
30. HESIONIDAE, JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31. SYLLIDAE	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
32. AUTOLYTUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33. TYPOSYLLIS SP.	0	1	2	0	0	1	0	0	0	0	0	0	0	0	0
34. EUSYLLIS BLOMSTRANDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35.EXOGONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36. SPHAEROSYLLIS SP.	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
37. BRANIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38. NEREIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39. NEREIS SP.	0	1	0	0	0	0	0	0	0	0	0	0	O	0	0
40. NEPHTYS SP.	0	0	0	0	0	0	0	2	0	0	0	0	1	0	1
41. NEPHTYS CILIATA	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
42. NEPHTYS CAECA	3	6	3	0	0	0	0	2	0	0	0	1	O	1	0
43. NEPHTYS RICKETTSII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44. NEPHTYS LONGOSETOSA	0	0	0	0	0	0	2	0	2	0	5	15	15	13	13
45. NEPHTYS FERRUGINEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46. SPHAERODOROPSIS MINUTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47.GLYCERA SP.,	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
48. GLYCERA CAPITATA	4	3	8	3	1	3	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

	SAMPLES														
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	04	04	04	06	06	06	06	06	06	06	06	07	07	07	07
DEPTH	50	50	50	30	30	30	50	50	50	50	50	10	10	10	10
REPLICATE	3	4	5	1	2	4	1	2	3	4	5	1	2	3	4
SPECIES															
49. GONIADIDAE	o	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50. GLYCINDE PICTA	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
51. GLYCINDE ARMIGERA	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0
52. ONUPHIS IRIDESCENT	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0
53. LUMBRINERIS SP.	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0
54. LUMBRINERIS BICIRRATA	0	o	0	0	0	0	1	0	0	0	0	0	0	0	0
55. DORVILLEIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56. PROTODORVILLEA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57. OPHRYOTROCHA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58. SCHISTOMERINGOS CAECA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59. SCHISTOMERINGOS ANNULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60. SCOLOPLOS ARMIGER	3	5	6	4	1	10	14	15	20	5	17	5	29	9	1
61. SCOLOPLOS ARMECEPS	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
62. PARAONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63, ARICIDEA NR. SUECICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64. ARICIDEA LOPEZI LOPEZI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65. ARICEDEA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66. PARAONELLA PLATYBRANCHIA	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
67. APISTOBRANCHUS TULLBERGI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68. SPIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
.59. SPIONIDAE GEN NOV	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
70. POLYDORA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71. POLYDORA SOCIALIS	0	0	0	0	0	0	12	2	6	1	0	0	0	0	0
72. POLYDORA CAULLERYI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73. GATTYANA CIRROSA	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
74, FWIONOSF'1O STEENSTRUPI	1	2	0	1	1	0	0	0	0	0	0	0	0	0	0
75. SPIO SP.	0	o	0	0	0	0	0	0	0	0	0	0	0	0	0
76, SPIO NFi FILICORNIS	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
77. SPIOPHANES? SP.	0	o	0	0	0	0	0	0	0	0	0	0	0	0	0
78. SPIOPHANES BOMBYX	3	27	7	0	0	4	2	0	0	0	0	6	13	0	5
79, SPIOPHANES BERKELEYORUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80. SCOLELEPIS SQUAMATA	0	0	0	0	0	0	0	0	0	5	0	1	0	0	1
81. MINUSPIO CIRRIFERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82. MAGELONA NR CERAE	0	0	0	0	0	0	6	4	4	2	2	0	0	0	0
83, MAGELONA SACCULATA	0	0	0	0	0	0	14	8	5	3	2	9	6	6	11
84. CHAETOPTERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85. CHAETOPTERUS VARIOPEDATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
86. SPIOCHAETOPTERUS SP.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
87. SPIOCHAETOPTERUS COSTARUM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
88. CIRRATULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89. CIRRATULUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90, THARYX SP.	1	4	0	0	0	4	0	0	0	0	0	0	0	0	1
91. CHAETOZONE SETOSA	0	0	0	1	0	1	1	1	El	2	2	2	1	1	0
92. FLABELLIGERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93. BRADA VILLOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
94. PHERUSA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95. PHERUSA PLUMOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96. ARMANDIA BREVIS	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
97, OPHELIA SF',	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

	SAMPLES														
MONTH	06	06	06	06	06	04	06	06	06	06	06	06	06	06	06
TRANSECT	04	04	04	06	06	06	06	06	06	06	06	07	07	07	07
DEPTH	50	50	50	30	30	30	50	50	50	50	50	10	10	10	10
REPLICATE	3	4	5	1	2	4	1	2	3	4	5	1	2	3	4
SPECIES															
98. OPHELIA LIMACINA	1	11	1	0	2	1	8	12	5	3	9	0	0	0	0
99. TRAVISIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100. TRAVISIA FORBESII	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
101. TRAVISIA PUPA	0	0	0	0	0	0	0	0	0	0	0	5	5	16	7
102, OPHELINA BREVIATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103, CAPITELLA CAPITATA	0	.0	0	0	0	0	0	0	0	0	0	0	0	0	0
104. NOTOMASTUS LINEATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105. MED1OMASTUS CALIFORNIENSIS	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0
106. DECAMASTUS GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107. BARONTOLLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108. MALDANIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109. PRAXILLELLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110. RHODINE BIRORQUATA	3	5	2	0	0	0	0	0	0	0	0	0	0	0	0
111, OWENIA FUSIFORMIS	125	83	287	43	9	67	1	0	0	0	0	0	1	0	0
112. MYRIOCHELE SP.	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
113. MYRIOCHELE OCULATA	0	0	0	0	0	0	7	12	4	2	15	0	0	0	0
114. PECTINARIIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115. CISTENIDES GRANULATA	8	28	10	0	0	2	0	0	0	0	0	0	0	0	0
116. AMPHARETIDAE	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
117. AMPHARETE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
118.AMPHARETE GOESI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
119, AMPHARE CF ACUTIFRONS	2	9	6	0	0	2	10	13	25	7	2	0	0	0	0
120. ASABELLIDES SIBIRICA	o	1	0	0	0	0	0	0	0	0	0	0	0	0	0
121. TEREBELLIDAE	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0
122. LEAENA ABRANCHIATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
123. NICOLEA ZOSTERICOLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
124. PISTA CRISTATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125.POLYCIRRUS SP',	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
126. LANASSA VENUSTA VENUSTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1270 LAPHANIA BOECKI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128. PROCLEA GRAFFII	1	0	2	0	0	0	0	1	0	0	0	0	0	0	0
129. SABELLIDAE	0	2	0	0	0	5	0	0	0	0	0	0	0	0	0
130. CHONE SP.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
131. CHONE GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132. CHONE MAGNA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133. EUCHONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
134. EUCHONE ANALIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135. EUCHONE HANCOCKI	o“	0	0	0	0	0	0	0	0	0	0	0	0	0	0
136. EUCHONE ARENAE	o	1	0	0	0	0	0	0	0	0	0	0	0	0	0
137. POTAMILLA RENIFORMIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
138. SABELLA MEDIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139. SERPULIDAE	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140. POLYGORDIUS SP.	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
141. OLIGOCHAETA	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
142. HIRUDINEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
143. MOLLUSCA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
144. GASTROPODA	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
145. LEPETA SP. A	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
146. MARGARITES SP.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0

APPENDIX D

(continued)

	SAMPLES														
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	04	04	04	06	06	06	06	06	06	06	06	07	07	07	07
DEPTH	50	50	50	30	30	30	50	50	50	50	50	10	10	10	10
REPLICATE	3	4	5	1	2	4	1	2	3	4	5	1	2	3	4
SPECIES															
147. MARGARITES CF. HELICINUS	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0
148. MARGARITAS COSTALIS	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
149. LITTORINA SF',	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150. TACHYRHYNCHUS EROSUS	0	0	0	0	0	0	1	3	0	1	7	0	0	0	0
151. TRICHOTROFIS CANCELLATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152. MARSENIA CF. RHOMBICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
153. NATICA CLAUSA	1	2	3	0	0	1	0	0	0	0	1	0	0	0	0
154. POLINICES SF.	0	0	0	0	0	0	3	2	1	2	1	0	0	0	0
155. TURR1OAE, JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
156. SUAVODRILLIA KENNICOTTII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157. MANGELIA? SF. A	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
158. OENOFOTA SF.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159. OENOFOTA CF. TURRICULA	0	0	0	0	0	0	2	3	1	0	1	0	0	0	0
160. OENOFOTA CF. ARCTICA	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
161. OENOFOTA SF. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162. KURTSIELLA FLUMBAE	0	0	0	0	0	0	8	2	5	3	7	0	0	0	0
163. TURRIDAE SF. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
164, ODOSTOMIA SF'.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165. TURBONILLA SF.	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
166* CEPHALASPIDEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
167. CYLICHNA SF',	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1613. CYLICHNA ALBA	0	0	0	0	0	0	3	2	3	0	0	0	0	0	0
169. CYLICHNA? SF'. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170. SCAPHANDER SF'. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
171. PHILINE SF'. A	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
172. PHILINE SF', B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
173. DIAPHANA MINUTA	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
174. HAMINOEA SF. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175* RETUSA SF. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
176. RETUSA SF'. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177. NUDIBRANCHIA	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
178. NEAEROMYA COMPRESSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
179. BIVALVIA	0	0	0	0	0	0	0	0	i	1	1	0	0	0	0
180. NUCULA TENUIS	0	0	0	0	0	0	1	1	2	3	1	0	0	0	0
181. NUCULANA SF,	0	1	0	0	0	0	0	0	0	()	0	0	0	0	0
182. NUCULANA CF. PERNULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183. YOLDIA CF. HYPERBOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184. YOLDIA MYALIS	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0
185. YOLDIA SCISSURATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
186. MYTILIDAE	0	0	0	0	0	0	0	0	0	()	0	0	0	0	0
187. MEGACRENELLA COLUMBIANA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
188. MUSCULUS SF. JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
189. MUSCULUS NIGER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190. MUSCULUS CF. DISCORS	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
191. MODIOLUS SF'.	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
192. LIMA SF.	0	0	0	0	0	0	0	0	()	0	0	0	0	0	0
193. LIMATULA SF'.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
194. LIMATULA SUBAURICULATA	0	0	0	0	0	0	0	()	0	0	0	0	0	0	0
195. LIMATULA CF. ATTENUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	04	04	04	06	06	06	06	06	06	06	06	07	07	07	07
DEPTH	50	50	50	30	30	30	50	50	50	50	50	10	10	10	10
REPLICATE	3	4	5	1	2	4	1	2	3	4	5	1	2	3	4
196. AXINOPSIDA SERRICATA	0	0	0	0	0	0$0	0	0	0	0	0	0	0	0	0
197. DIPLODONTA CF. IMPO	0	0	0	0	0	O*O	0	0	0	0	0	0	0	0	0
198. CYCLOCARDIA SP.	0	0	0	0	0	O*O	0	0	0	0	0	0	0	0	0
199. MYSELLA CF. TUMIDA	0	0	0	0	0	0.0	0	3	2	0	3	0	0	0	0
200. CYCLOCARDIA CREBRICOSTATA	0	0	0	0	1	0.0	6	4	13	14	20	0	0	0	0
201. CYCLOCARDIA INCISA	0	0	0	0	0	O*O	0	0	0	0	0	0	0	0	0
202. ASTARTE SP., JUV.	0	0	0	0	0	0.0	0	0	0	1	0	0	0	0	0
203. ASTARTE ROLLANDI	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
204. ASTARTE CF. VERNICOSA	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
205. CLINOCARDIUM SP., JUV.	2	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
206. SERRIPES GROENLANDICUS	0	0	0	0	0	O*O	0	0	0	1	0	0	0	0	0
207. SPISULA SP.	0	0	0	0	0	O*O	0	0	0	2	0	0	0	0	0
208. MACTRA ALASKANA	0	0	0	0	0	0.0	11	24	16	11	28	0	0	0	0
209. MACTRA NASUATA	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
210. SILIQUA PATULA	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
211. MACOMA SP,	0	0	0	0	0	0.0	3	2	2	0	3	0	1	0	0
212. MACOMA MOESTA	0	0	0	0	0	0.0	0	0	0	0	3	0	0	0	0
213. MACOMA MOESTA ALASKANA	0	0	0	0	0	0.0	0	2	0	0	0	0	0	0	0
214. MACOMA CRASSULA	0	1	0	0	0	0.0	0	0	0	0	0	0	0	0	0
215. MACOMA LAMA	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	1
216. MACOMA BALTHICA	1	3	1	1	0	0.0	i	0	0	3	0	0	0	0	0
217. MACOMA CF. BALTHICA	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
218. MACOMA CF. CALCAREA	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
219. MACOMA SP. A	0	0	0	0	0	O*O	0	0	0	0	0	0	0	0	0
220. TELLINA SP,	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
221. TELLINA NUCULOIDES	0	0	0	0	0	0.0	6	9	6	3	6	0	0	0	0
222. SAXIDOMUS GIGANTEA	0	0	0	1	0	O*O	0	0	0	0	0	0	0	0	0
223. PSEPHIDIA LORDI	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
224. HUMILARIA KENNERLYI	0	0	0	0	0	O*O	0	0	0	0	0	0	0	0	0
225. PATINOPECTEN CAUIRUS	0	0	0	()	0	().0	0	0	0	0	1	0	0	0	0
226. MYA SP.	1	2	0	0	0	0.0	0	0	0	0	0	0	0	0	0
227. HIATELLA ARCTICA	0	0	1	0	0	0.0	0	0	0	0	0	0	0	0	0
228. LYONSIA CALIFORNIA	0	0	0	0	0	0.0	1	1	0	2	0	0	0	0	0
229. THRACIA SP. ,	0	0	0	0	0	0.0	4	1	1	0	3	0	0	0	0
230. DECAPODA	0	0	0	0	0	0,0	0	0	0	0	0	0	2	0	0
231. CARIDEA	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
232. PAGURIDAE	0	0	0	0	0	O*O	1	0	0	0	0	0	0	0	0
233. MAJIDAE	0	0	1	0	0	0.0	0	0	0	0	0	0	0	0	0
234. OROGONIA GRACILIS	0	0	0	0	0	O*O	0	0	0	0	0	0	0	0	0
235. CHIONIECETES SP.	0	0	0	0	0	O*O	0	0	0	0	0	0	0	0	0
236. CANCRIDAE	3	4	0	0	0	1.0	0	0	0	0	0	0	0	0	0
237. PINNOTHERIDAE	0	0	0	0	0	0.0	1	0	3	1	1	0	0	0	0
238. SIPUNCULA	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
239. ALCYONIDIUM SP.	0	0	0	0	0	-0.5	0	0	0	0	0	0	0	0	0
240. ASTERIAS AMURENSIS	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0
241. OPHIUROIDEA	3	12	9	0	1	1.0	0	1	2	0	3	0	0	0	0
242. STRONGYLOCENTROTUS DROEBACHIENSIS	0	0	1	0	0	O*O	0	0	0	0	0	0	0	0	0
243. DENDRASTER EXCENTRICUS	0	0	0	0	0	0.0	15	55	28	20	21	0	0	0	0
244. SPATANGIDAE	0	0	0	0	0	0.0	0	o	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

MONTH	06	06	06	06	06	06	04	06	06	06	06	06	06	06	06
TRANSECT	04	04	04	06	06	06	06	06	06	06	06	07	07	07	07
DEPTH	50	50	50	30	30	30	50	50	50	50	50	10	10	10	10
REPLICATE	3	4	5	1	2	4	1	2	3	4	5	1	2	3	4
SPECIES															
245. DENDROCHIROTIDA	O*OO	0.00	O*OO	O*OO	0.00	0.00	0.00	O*OO	0.00	0.00	0.00	0.00	0.00	0.00	0.00
246. HOLOTHUROIDEA DENDROCHIROTACEA	0.00	0.00	O*OO	0.00	O*OO	0.00	O*OO	O*OO	O*OO	O*OO	0,00	O*OO	O*OO	0.00	O*OO
247. HAVELOCKIA SP. B	0.00	O*OO	O*OO	O*OO	O*OO	0.00	0.00	0.00	0.00	0.00	0.00	O*OO	0.00	0.00	0.00
248, THYONINAE A	O*OO	O*OO	0.00	0.00	0.00	0000	O*OO	O*OO	0.00	O*OO	0.00	O*OO	O*OO	0.00	O*OO
249. EUPENTACTA QUINQUESEMITA	O*OO	1,00	1*OO	O*OO	O*OO	O*OO	0.00	0.00	0.00	O*OO	0.00	0.00	0.00	O*OO	O*OO
250. PENTAMERA SP.	O*OO	O*OO	O*OO	O*OO	O*OO	O*OO	O*OO	O*OO	0.00	O*OO	O*OO	O*OO	0.00	0.00	0.00
251. PENTAMERA LISSOPLACA	1*OO	1*OO	5000	O*OO	0.00	O*OO	0.00	O*OO	O*OO	O*OO	0.00	O*OO	0.00	O*OO	0.00
252. PENTAMERA SP. B	1.00	1*OO	3*OO	O*OO	O*OO	0.00	O*OO	O*OO	0.00	0.00	0.00	O*OO	0.00	0.00	0.00
253. CHIRIDOTIDAE	0.00	O*OO	O*OO	0.00	O*OO	0900	O*OO	O*OO	O*OO	O*OO	O*OO	O*OO	O*OO	0.00	O*OO
254. CHIRIDOTA SP.	O*OO	I*OO	0.00	0.00	0.00	2*OO	O*OO	O*OO	0.00	0.00	O*OO	0,00	O*OO	0.00	O*OO
255. MYRIOTRHOCHIDAE	O*OO	O*OO	0.00	0.00	0.00	0.00	0.00	0.00	O*OO	O*OO	O*OO	O*OO	O*OO	0.00	0.00
256. HEMICHORDATA	0.00	0.00	0.00	O*OO	0.00	O*OO	O*OO	O*OO	0.00	0.00	O*OO	O*OO	0.00	0.00	0,00
257. UROCHORDATA	0.00	O*OO	O*OO	O*OO	0.00	0,00	O*OO	O*OO	0.00	O*OO	0.00	O*OO	O*OO	0.00	O*OO
258. DISTAPLIA SP.	O*OO	O*OO	0.00	0.00	0.00	0.00	O*OO	0.00	0.00	O*OO	0,00	0.00	0.00	O*OO	O*OO
259. AGNESIA SEPTENTRIONALIS	0.00	2*OO	O*OO	0.00	O*OO	O*OO	O*OO	1000	O*OO	O*OO	O*OO	0.00	O*OO	O*OO	0.00
260. STYELA ?CORIACEA	O*OO	O*OO	0.00	O*OO	0.00	O*OO	0.00	O*OO	O*OO	0.00	0,00	0000	O*OO	O*OO	O*OO
261. HALoCYNTHIA AURANTIUM	0900	0,00	O*OO	0.00	0,00	0,00	O*OO	O*OO	0,00	O*OO	0.00	O*OO	O*OO	O*OO	0.00
262. AMMODYTES HEXAPTERUS	O*OO	O*OO	O*OO	O*OO	O*OO	O*OO	0.00	O*OO	O*OO	0,00	O*OO	0.00	0.00	1.00	O*OO
263. NSPECIES	33.0	50.0	32*O	1300	14,0	28,0	38,0	38,0	29*O	28.0	35.0	10*O	13$0	11.0	9*OO
264. H	1.80	2.89	1.37	1*43	2.23	1486	3,20	2*88	2*86	2*86	2.97	1.90	1.85	1.81	1*73
265. EVENNESS	.514	.739	,394	'557	,846	0.56	,878	,792	0.85	.859	,834	,826	.722	.755	,787
266. TOTAE	193.	284,	387.	65.0	32*O	337*	160,	216.	181.	103.	183,	46.0	77.0	51.0	41.0

APPENDIX D

(continued)

SAMPLES

MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	07	07	07	07	07	07	07	07	07	07	08	09	09	09	10
DEPTH	10	30	30	30	30	50	50	50	50	50	50	30	30	50	10
REPLICATE	5	2	3	4	5	1	2	3	4	5	1	1	2	1	1
SPECIES															
1. CNIDARIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. PANDEA SP. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3* TIMA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4* ANTHOZOA	0	3	0	2	7	0	2	0	0	1	0	0	0	0	0
5. PLATYHELMINTHES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6. NEMERTINEA	0	6	1	15	20	8	9	1	9	0	26	2	3	31	1
7. NEMATODA	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
8, POLYCHAETA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9* POLYNOIDAE	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
10. ARCTEOBIA ANTICOSTIENSIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11. EUNOE CIRROSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12. HARMOTHOE EXTENUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13. HARMOTHOE MULTISETOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14. LEPIDONOTUS SQUAMATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15. SIGALIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. PHOLOE MINUTA	0	8	0	0	6	0	0	0	1	0	0	0	0	1	0
17. SIGALION SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18. PISIONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19. PHYLLODOCIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20. ANAITIDES GROENLANDICA	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0
21. ANAITIDES MUCOSA	0	4	1	1	2	3	5	6	1	0	1	0	i	10	0
22. ANAITIDES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23. ETEONE SP.	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
24. ETEONE LONGA	0	8	1	1	1	4	4	8	5	0	20	1	9	4	1
25. EULALIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26. MYSTA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
27. MYSTA BARBATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28, HESIONURA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29. HESIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30. HESIONIDAE, JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31. SYLLIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32. AUTOLYTUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33* TYPOSYLLIS SP.	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0
34* EUSYLLIS BLOMSTRANDI	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
35. EXOGONE SP.	0	0	0	0	3	0	0	()	0	0	0	0	0	0	0
36, SPHAEROSYLLIS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37. BRANIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38. NEREIDAE	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
39. NEREIS SP.	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
40. NEPHTYS SP.	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0
410 NEPHTYS CILIATA	0	0	2	1	2	0	0	0	0	0	0	0	0	0	0
42. NEPHTYS CAECA	0	1	0	0	0	1	0	0	1	0	1	1	0	1	0
43. NEPHTYS RICKETTSII	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
44* NEPHTYS LONGOSETOSA	13	0	0	0	0	0	0	0	0	1	0	0	0	0	0
45. NEPHTYS FERRUGINEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46. SPHAERODOROPSIS MINUTA	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
47. GLYCERA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48. GLYCERA CAPITATA	0	2	0	1	1	2	7	8	6	8	0	0	0	0	0

APPENDIX D

(continued]

SAMPLES

SPECIES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	07	07	07	07	07	07	07	07	07	07	08	09	09	09	10
DEPTH	10	30	30	30	30	50	50	50	50	50	50	30	30	50	10
REPLICATE	5	2	3	4	5	1	2	3	4	5	1	1	2	1	1
49, GONIADIDAE	o	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50. GLYCINDE PICTA	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
51. GLYCINDE ARMIGERA	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0
52. ONUPHIS IRIDESCENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53. LUMBRINERIS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54. LUMBRINERIS BICIRRATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55. DORVILLEIDAE	0	0	0	0	0	0	0	0	O	0	0	0	0	0	0
56. PROTODORVILLEA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57. OPHRYOTROCHA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58. SCHISTOMERINGOS CAECA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59. SCHISTOMERINGOS ANNULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60. SCOLOPLOS ARMIGER	3	0	5	14	2	4	5	1	2	3	10	0	29	16	0
61, SCOLOPLOS ARMECEPS	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
62. PARAONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63. ARICIDEA NR. SUECICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64, ARICIDEA LOPEZI LOPEZI	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0
65. ARICEDEA SP. A	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
66. PARAONELLA PLATYBRANCHIA	0	0	0	0	0	0	0	0	0	0	0	0	O	0	O
67. APISTOBRANCHUS TULLBERGI	0	0	0	0	0	0	0	0	0	0	0	0	O	0	O
68. SPIONIDAE	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
69. SPIONIDAE GEN NOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
70. POLYDORA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71. POLYDORA SOCIALIS	0	0	0	0	0	0	0	0	0	0	2	0	0	6	0
72. POLYDORA CAULLERYI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73. GATTYANA CIRROSA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
74. PRIONOSPIO STEENSTRUPI	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
75. SPIO SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76. SPIO NR FILICORNIS	0	0	1	0	2	2	1	2	1	0	7	0	3	5	0
77. SPIOPHANES? SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78. SPIOPHANES BOMBYX	4	5	24	12	20	76	117	60	92	1	52	3	12	252	0
79, SPIOPHANES BERKELEYORUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80. SCOLELEPIS SQUAMATA	0	0	0	0	0	0	0	0	0	0	12	0	0	1	0
81. MINUSPIO CIRRIFERA	0	0	0	O	0	0	0	0	0	0	0	0	0	0	0
82. MAGELONA NR CERAE	0	3	i	0	0	0	0	0	0	0	14	0	0	12	0
83. MAGELONA SACCULATA	3	0	0	0	0	0	0	0	0	0	27	0	11	2	0
84. CHAETOPTERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85. CHAETOPTERUS VARIOPEDATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
86. SPIOCHAETOPTERUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87. SPIOCHAETOPTERUS COSTARUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
88. CIRRATULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89. CIRRATULUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90. THARYX SP.	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
91. CHAETOZONE SETOSA	0	1	1	1	3	0	0	0	0	0	1	0	0	1	0
92. FLABELLIGERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93. BRADA VILLOSA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
94, PHERUSA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95. PHERUSA PLUMOSA	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
96. ARMANDIA BREVIS	0	3	0	0	2	0	0	0	0	0	0	0	0	0	0
97. OPHELIA SP.	0	0	0	0	0	()	()	()	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	07	07	07	07	07	07	07	07	07	07	08	09	09	0?	10
DEPTH	10	30	30	30	30	50	50	50	50	50	50	30	30	50	10
REPLICATE	5	2	3	4	5	1	2	3	4	5	1	1	2	1	1
98. OPHELIA LIMACINA	0	0	0	0	1	5	7	6	1	2	32	2	B	7	0
99. TRAVISIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100* TRAVISIA FORBESII	0	0	0	1	0	0	0	0	1	0	0	0	0	5	0
101. TRAVISIA PUPA	7	0	0	0	0	0	0	0	0	0	0	0	0	2	1
102* OPHELINA BREVIATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103* CAPITELLA CAPITATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104* NOTOMASTUS LINEATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
105. MEDIOMASTUS CALIFORNIENSIS	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0
106, DECAMASTUS GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107* BARONTOLLA SP,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108. MALDANIDAE	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
109* PRAXILLELLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110* RHODINE BIRORQUATA	0	16	0	1	8	0	0	0	0	0	0	0	0	0	0
111* OWENIA FUSIFORMIS	0	3	36	44	25	0	10	5	7	7	0	69	33	1	0
112. MYRIOCHELE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113* MYRIOCHELE OCULATA	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
114* PECTINARIIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
115. CISTENIDES GRANULATA	0	35	0	2	8	0	1	1	1	0	0	0	0	0	0
116. AMPHARETIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
117. AMPHARETE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
118. AMPHARETE GOESI	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0
119. AMPHARE CF ACUTIFRONS	0	6	0	3	2	0	2	0	3	0	8	0	4	5	0
120. ASABELLIDES SIBIRICA	0	2	0	0	5	0	0	0	0	0	0	0	0	0	0
121. TEREBELLIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122. LEAENA ABRANCHIATA	0	0	0	0	0	0	0	2	0	0	0	0	2	0	0
123. NICOLEA ZOSTERICOLA	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0
124* PISTA CRISTATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125. POLYCIRRUS SP.	0	2	0	0	0	1	2	1	1	1	0	0	0	0	0
126, LANASSA VENUSTA VENUSTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127. LAPHANIA BOECKI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128. PROCLEA GRAFFII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129. SABELLIDAE	0	42	0	0	14	0	0	0	0	0	0	0	0	0	0
130. CHONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
131* CHONE GRACILIS	0	142	0	0	35	0	0	0	1	0	0	0	0	0	0
132. CHONE MAGNA	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
133, EUCHONE SP',	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
134* EUCHONE ANALIS	0	133	0	2	262	0	0	0	0	0	0	0	0	0	0
135. EUCHONE HANCOCKI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
136. EUCHONE ARENAE	0	0	0	0	0	5	1	0	5	0	0	0	0	0	0
137. POTAMILLA RENIFORMIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
138. SABELLA MEDIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
139* SERPULIDAE	0	()	()	0	0	0	()	0	0	0	()	0	0	0	0
1400 POLYGORDIUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141* OLIGOCHAETA	0	()	0	0	0	0	0	0	0	()	0	0	0	0	0
1420 HIRUDINEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
143. MOLLUSCA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
144. GASTROPODA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145. LEPETA SP. A	0	15	0	0	3	0	0	0	0	0	0	0	0	0	0
146, MARGARITES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	07	07	07	07	07	07	07	07	07	07	08	09	09	09	10
DEPTH	10	30	30	30	30	50	50	50	50	50	50	30	30	50	10
REPLICATE	5	2	3	4	5	1	2	3	4	5	1	1	2	1	1
147. MARGARITAS CF. HELICINUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
148. MARGARITES COSTALIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
149, LITTORINA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150. TACHYRHYNCHUS EROSUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
151. TRICHOTROPIS CANCELLATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152. MARSENIA CF. RHOMBICA	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
153. NATICA CLAUSA	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
154. POLINICES SP.	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
155. TURRIDAE, JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
156. SUAVODRILLIA KENNICOTTII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157. MANGELIA? SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
158, OENOPOTA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159. OENOPOTA CF. TURRICULA	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
160. OENOPOTA CF. ARCTICA	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
161. OENOPOTA SP', A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162* KURTSIELLA PLUMBAE	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
1630 TURRIDAE SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
164. ODOSTOMIA SP',	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165. TURBONILLA SP'.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
166. CEPHALASPIDEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
167. CYLICHNA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
168. CYLICHNA ALBA	0	0	0	0	1	0	0	0	2	1	1	0	0	0	0
169. CYLICHNA? SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170. SCAPHANDER SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
171. PHILINE SP'. A	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
172* PHILINE SP. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
173. DIAPHANA MINUTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
174. HAMINOEA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175. RETUSA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
176. RETUSA SP. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177* NUDIBRANCHIA	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
178. NEAEROMYA COMPRESSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
179* BIVALVIA	0	1	0	0	0	0	0	0	0	0	0	()	0	0	0
180. NUCULA TENUIS	0	0	0	0	0	0	0	0	0	0	0	0	()	0	()
181. NUCULANA SP'.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182. NUCULANA CF* PERNULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183. YOLDIA CF. HYPERBOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184. YOLDIA MYALIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
185. YOLDIA SCISSURATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
186. MYTILIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
187, MEGACRENELLA COLUMBIANA	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
188. MUSCULUS SP. JUV.	0	0	0	0	0	0	0	0	()	0	0	0	0	0	0
189, MUSCULUS NIGER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190. MUSCULUS CF. DISCORS	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
191, MODIOLUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
192. LIMA SP.	0	0	0	0	0	0	0	()	()	0	()	0	0	0	0
193. LIMATULA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
194, LIMATULA SUBAURICULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
195. LIMATULA CF. ATTENUATA	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

	SAMPLES														
MONTH	(-)6	0.5	06	06	06	06	06	06	06	06	06	06	06	06	06
TRANSECT	07	07	07	07	07	07	07	07	07	07	08	09	0?	09	10
DEPTH	10	30	30	30	30	50	50	50	50	50	50	30	30	50	10
REPLICATE	5	2	3	4	5	1	2	3	4	5	i	1	2	1	1
SPECIES															
196. AXINOPSIDA SERRICATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
197. DIPLODONTA CF. IMPO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
198. CYCLOCARDIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
199. MYSELLA CF. TUMIDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200. CYCLOCARDIA CREBRICOSTATA	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
201. CYCLOCARDIA INCISA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
202. ASTARTE SP., JUV.	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
203. ASTARTE ROLLANDI	0	0	0	0	0	0	4	3	2	2	0	1	0	0	0
204. ASTARTE CF. VERNICOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
205. CLINOCARDIUM SP., JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
206. SERRIPES GROENLANDICUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
207. SPISULA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
208. MACTRA ALASKANA	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
209. MACTRA NASUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
210. SILIQUA PATULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
211. MACOMA SP.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
212. MACOMA MOESTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
213. MACOMA MOESTA ALASKANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
214. MACOMA CRASSULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
215. MACOMA LAMA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
216. MACOMA BALTHICA	0	8	0	1	9	0	0	1	0	0	0	0	0	0	0
217. MACOMA CF. BALTHICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
218. MACOMA CF. CALCAREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219. MACOMA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
220. TELLINA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
221. TELLINA NUCULOIDES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
222. SAXIDOMUS GIGANTEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
223. PSEPHIDIA LORDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
224. HUMILARIA KENNERLYI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225. PATINOPECTEN CAUIRUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
226. MYA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
227. HIATELLA ARCTICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
228. LYONSIA CALIFORNIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
229. THRACIA SP. ,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
230. DECAPODA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
231. CARIDEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
232. PAGURIDAE	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
233. MAJIDAE	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
234. OROGONIA GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
235. CHIONIECETES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
236. CANCRIDAE	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0
237. PINNOTHERIDAE	0	0	()	0	0	0	0	0	0	0	0	0	0	0	0
238. SIPUNCULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
239. ALCYONIDIUM SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
240. ASTERIAS AMURENSIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
241. OPHIUROIDEA	0	30	0	0	7	0	0	0	0	0	0	0	0	0	0
242. STRONGYLOCENTROTUS DROEBACHIENSIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
243. DENDRASTER EXCENTRICUS	0	0	0	0	0	2	4	2	1	3	5	0	14	12	2
244. SPATANGIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES	MONTH / TRANSECT / DEPTH / REPLICATE	06 07 10 5	06 07 30 2	06 07 30 3	06 07 30 4	06 07 30 5	06 07 50 1	06 07 50 2	06 07 50 3	06 07 50 4	06 07 50 5	06 08 50 1	06 09 30 1	06 09 30 2	06 09 50 1	06 10 10 1
245. DENDROCHIROTIDA		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
246. HOLOTHUROIDEA DENDROCHIROTACEA		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
247. HAVELOCKIA SP. B		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
248. THYONINAE A		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
249. EUPENTACTA QUINQUESEMITA		0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250. PENTAMERA SP.		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
251. PENTAMERA LISSOPLACA		0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
252. PENTAMERA SP. B		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
253. CHIRIDOTIDAE		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00
254. CHIRIDOTA SP.		0.00	4.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255. MYRIOTRHOCHIDAE		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
256. HEMICHORDATA		0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
257. UROCHORDATA		0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
258. DISTAPLIA SP.		0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
259. AGNESIA SEPTENTRIONALIS		0.00	15.0	0.00	64.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
260. STYELA ?CORIACEA		0.00	0.00	0.00	0.00	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
261. HALOCYNTHIA AURANTIUM		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
262. AMMODYTES HEXAPTERUS		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
263. NSPECIES		6.00	38.0	11.0	21.[illegible]	48.0	14.0	17.0	16.[illegible]	22.0	13.0	27.0	7.00	14.0	25.0	8.00
264. H		1.53	2.44	1.50	1.9[illegible]	2.21	1.50	1.57	1.7[illegible]	1.66	2.23	2.59	.54	2.16	1.52	1.89
265. EVENNESS		.852	.671	.626	.62	0.57	.568	.555	.63[illegible]	.537	.868	.787	.3[illegible]6	.817	.472	.909
266. TOTAB		31.0	523.	78.0	170.	496.	118.	183.	108.	146.	32.0	242.	79.0	131.	381.	[illegible]6.0

APPENDIX D

(continued)

	SAMPLES														
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	08	08
TRANSECT	10	10	10	11	11	11	11	11	11	11	11	11	11	A4	01
DEPTH	16	30	50	15	15	30	30	30	50	50	50	50	50	30	60
REPLICATE	1	1	1	1	2	1	2	3	1	2	3	4	5	1	1
SPECIES	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1. CNIDARIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. PANDEA SP. 1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
3. TIMA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4. ANTHOZOA	0	0	1	0	0	1	0	0	1	0	0	1	1	2	0
5. PLATYHELMINTHES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*
6. NEMERTINEA	-	8	3	0	0	39	9	38	1	8	4	24	27	4	0
7. NEMATODA	0	0	0	0	3	3	3	50	1	0	1	1	2	0	0
8. POLYCHAETA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9. POLYNOIDAE	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
10. ARCTEOBIA ANTICOSTIENSIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11. EUNOE CIRROSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12. HARMOTHOE EXTENUATA	0	0	0		0	0	0	0	0	0	0	0	0	0	0
13. HARMOTHOE MULTISETOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14. LEPIDONOTUS SQUAMATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15. SIGALIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
16. PHOLOE MINUTA	0	0	2	0	0	0	0	0	0	0	0	1	4	0	1
17. SIGALION SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18. PISIONE SP.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
19. PHYLLODOCIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20. ANAITIDES GROENLANDICA	0	9	0	0	0	0	0	0	0	0	1	0	0	0	0
21. ANAITIDES MUCOSA	0	3	6	0	.	2	2	5	1	3	3	3	9	0	0
22. ANAITIDES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
23. ETEONE SP.	0	0	0	0	0	0	0	1	0	0	0	7	1	0	1
24. ETEONE LONGA	2	14	1		0	0	0	6	4	0	8	0	15	1	0
25. EULALIA SP.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
26. MYSTA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27. MYSTA BARBATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28. HESIONURA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
29. HESIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
30. HESIONIDAE, JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31. SYLLIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32. AUTOLYTUS SP.	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
33. TYPOSYLLIS SP.	0	0	0	0	0	1	2	2	0	0	0	0	0	0	0
34. EUSYLLIS BLOMSTRANDI	0	0		0	0	0	0	0	0	1	0	0	0	0	0
35. EXOGONE SP.	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
36. SPHAEROSYLLIS SP.	0	0	0			0	0	7	0	0	0	8	3	0	0
37. BRANIA SP.	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0
38. NEREIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39. NEREIS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40. NEPHTYS SP.	0	0	0	3	0	0	0	0	0	0	5	1	0	0	1
41. NEPHTYS CILIATA	0	0	0	0	0	2	0	2	3	0	3	1	0	0	0
42. NEPHTYS CAECA	0	0	.	0	0	2	6	1	1	2	0	1	1	0	0
43. NEPHTYS RICKETTSII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44. NEPHTYS LONGOSETOSA	0	0	0	0	3	0	0	0	1	0	0	0	1	0	4
45. NEPHTYS FERRUGINEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46. SPHAERODOROPSIS MINUTA	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
47. GLYCERA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48. GLYCERA CAPITATA	0	5	1	0	0	0	0	0	5	3	5	3	4	4	2

APPENDIX D

(continued)

SAMPLES

SPECIES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	08	08
TRANSECT	10	10	10	11	11	11	11	11	11	11	11	11	11	A4	01
DEPTH	16	30	50	15	15	30	30	30	50	50	50	50	50	30	60
REPLICATE	1	1	1	1	2	1	2	3	1	2	3	4	5	1	1
49. GONIADIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50. GLYCINDE PICTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
51. GLYCINDE ARMIGERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52. ONUPHIS IRIDESCENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
53. LUMBRINERIS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
54. LUMBRINERIS BICIRRATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55. DORVILLEIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56. PROTODORVILLEA SP.	0	0	0	0	0	0	0	20	0	0	0	0	0	1	0
57. OPHRYOTROCHA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58. SCHISTOMERINGOS CAECA	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
59. SCHISTOMERINGOS ANNULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60. SCOLOPLOS ARMIGER	12	36	27	2	6	1	1	0	4	9	3	2	11	13	2
61. SCOLOPLOS ARMECEPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62. PARAONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0
63. ARICIDEA NR. SUECICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64. ARICIDEA LOPEZI LOPEZI	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
65. ARICEDEA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66. PARAONELLA PLATYBRANCHIA	0	0	0	0	0	6	0	12	0	0	0	1	1	0	0
67. APISTOBRANCHUS TULLBERGI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68. SPIONIDAE	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
69. SPIONIDAE GEN NOV	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
700 POLYDORA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71. POLYDORA SOCIALIS	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0
72. POLYDORA CAULLERYI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73. GATTYANA CIRROSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74. PRIONOSPIO STEENSTRUPI	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
75. SPIO SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76. SPIO NR FILICORNIS	1	3	2	0	0	0	0	0	4	1	1	11	6	0	0
77. SPIOPHANES? SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78. SPIOPHANES BOMBYX	26	101	40	0	1	59	173	158	201	160	317	916	788	69	164
79. SPIOPHANES BERKELEYORUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80. SCOLELEPIS SQUAMATA	1	0	2	0	0	1	0	0	0	0	0	0	0	0	0
81. MINUSPIO CIRRIFERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82. MAGELONA NR CERAE	0	0	3	0	0	0	0	0	0	0	1	0	3	0	10
83. MAGELONA SACCULATA	42	0	5	0	0	0	0	0	0	0	0	0	0	0	0
84. CHAETOPTERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
85. CHAETOPTERUS VARIOPEDATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
86. SPIOCHAETOPTERUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87. SPIOCHAETOPTERUS COSTARUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
88. CIRRATULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89. CIRRATULUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90. THARYX SP.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5
910 CHAETOZONE SETOSA	8	7	2	0	0	0	0	0	0	0	0	2	3	0	?
92. FLABELLIGERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93. BRADA VILLOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
94. PHERUSA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95. PHERUSA PLUMOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96. ARMANDIA BREVIS	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
97. OPHELIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0

APPENDIX D

(continued)

	SAMPLES														
MONTH	06	06	06	06	06	0.5	06	06	06	06	06	06	06	08	08
TRANSECT	10	10	10	11	11	11	11	11	11	11	11	11	11	A4	01
DEPTH	16	30	50	15	15	30	30	30	50	50	50	50	50	30	60
REPLICATE	1	1	1	1	?	1	?	3	1	?	3	4	5	1	1
SPECIES															
98. OPHELIA LIMACINA	o	17	7	22	0	15	6	10	3	0	0	11	10	0	2
99, TRAVISIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100. TRAVISIA FORBESII	0	1	3	0	0	0	1	0	2	2	2	1	2	0	0
101. TRAVISIA PUPA	11	2	0	0	0	0	0	0	0	0	o	0	0	0	2
102. OPHELINA BREVIATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103. CAPITELLA CAPITATA	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
104. NOTOMASTUS LINEATUS	5	0	1	0	0	0	0	0	1	1	?	2	2	1	0
105. MEDIOMASTUS CALIFORNIENSIS	0	9	0	0	0	0	0	0	0	0	0	o	0	0	1
106. DECAMASTUS GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
107. BARONTOLLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
108. MALDANIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109. PRAXILLELLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
110. RHODINE BIRORQUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111. OWENIA FUSIFORMIS	0	2	2	0	3	195	141	154	17	26	39	14	20	1	0
112. MYRIOCHELE SP,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113* MYRIOCHELE OCULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
114. PECTINARIIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115. CISTENIDES GRANULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5
116. AMPHARETIDAE	0	0	0	0	1	0	0	0	0	0	0	6	17	0	14
117. AMPHARETE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
118, AMPHARETE GOESI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
119, AMPHARE CF ACUTIFRONS	8	12	2	0	0	0	0	0	3	0	1	1	0	1	3
120, ASABELLIDES SIBIRICA	o	0	0	0	0	0	0	0	0	0	0	0	0	0	0
121. TEREBELLIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122. LEAENA ABRANCHIATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
123. NICOLEA ZOSTERICOLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
124, PISTA CRISTATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
125. POLYCIRRUS SP.	0	0	0	0	0	0	0	0	1	0	0	0	1	1	7
126. LANASSA VENUSTA VENUSTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127. LAPHANIA BOECKI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128. PROCLEA GRAFFII	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
129. SABELLIDAE	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0
130. CHONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
131, CHONE GRACILIS	0	0	0	0	0	0	0	0	()	1	0	0	0	0	0
132, CHONE MAGNA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133. EUCHONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
134. EUCHONE ANALIS	0	0	0	0	0	0	0	3	0	0	1	0	0	0	0
135. EUCHONE HANCOCKI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144
13.5. EUCHONE ARENAE	0	0	0	0	0	9	0	0	11	3	21	17	8	0	1
137. POTAMILLA RENIFORMIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
138. SABELLA MEDIA	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0
139. SERPULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140, POLYGORDIUS SP,	0	0	0	0	1	77	10	127	1	1	0	39	3	0	0
141. OLIGOCHAETA	0	0	0	0	1	0	0	4	1	0	10	0	3	0	1
142. HIRUDINEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
143. MOLLUSCA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
144. GASTROPODA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
145. LEPETA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0"	o	0
146. MARGARITES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	08	08
TRANSECT	10	10	10	11	11	11	11	11	11	11	11	11	11	A4	01
DEPTH	16	30	50	15	15	30	30	30	50	50	50	50	50	30	60
REPLICATE	1	1	1	1	2	1	2	3	1	2	3	4	5	1	1
147, MARGARITES CF. HELICINUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
148. MARGARITAS COSTALIS	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0
149. LITTORINA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150. TACHYRHYNCHUS EROSUS	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
151. TRICHOTROPIS CANCELLATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152. MARSENIA CF. RHOMBICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
153. NATICA CLAUSA	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0
154. POLINICES SP.	0	3	0	0	0	0	0	2	0	0	0	0	0	0	2
155. TURRIDAE, JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
156. SUAVODRILLIA KENNICOTTII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157. MANGELIA? SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
158. OENOPOTA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159. OENOPOTA CF. TURRICULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
160. OENOPOTA CF. ARCTICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
161. OENOPOTA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162. KURTSIELLA PLUMBAE	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1
163. TURRIDAE SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
164. ODOSTOMIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
165. TURBONILLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
166. CEPHALASPIDEA	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
167. CYLICHNA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
168. CYLICHNA ALBA	0	5	1	0	0	0	0	0	4	0	0	3	0	0	1
169. CYLICHNA? SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170. SCAPHANDER SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
171. PHILINE SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
172. PHILINE SP. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
173. DIAPHANA MINUTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
174. HAMINOEA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
175. RETUSA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
176. RETUSA SP. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177. NUDIBRANCHIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
178. NEAEROMYA COMPRESSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
179. BIVALVIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180. NUCULA TENUIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
181. NUCULANA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
182. NUCULANA CF. PERNULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183. YOLDIA CF. HYPERBOREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184. YOLDIA MYALIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
185. YOLDIA SCISSURATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
186. MYTILIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
187. MEGACRENELLA COLUMBIANA	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
188. MUSCULUS SP, JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
189. MUSCULUS NIGER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190. MUSCULUS CF. DISCORS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
191. MODIOLUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
192. LIMA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
193. LIMATULA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
194, LIMATULA SUBAURICULATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
195. LIMATULA CF, ATTENUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES															
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	08	08
TRANSECT	10	10	10	11	11	11	11	11	11	11	11	11	11	A4	01
DEPTH	16	30	50	15	15	30	30	30	50	50	50	50	50	30	60
REPLICATE	1	1	1	1	2	1	2	3	1	2	3	4	5	1	1
SPECIES	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
196. AXINOPSIDA SERRICATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24
197. DIPLODONTA CF. IMPO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
198. CYCLOCARDIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
199. MYSELLA CF. TUMIDA	0	21	4	0	0	0	0	0	0	0	0	0	0	0	0
200. CYCLOCARDIA CREBRICOSTATA	0	54	2	0	0	0	0	0	55	14	5	5	7	0	2
201. CYCLOCARDIA INCISA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
202. ASTARTE SP., JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
203. ASTARTE ROLLANDI	0	1	0	0	0	28	27	11	1	1	0	0	1	0	0
204. ASTARTE CF. VERNICOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
205. CLINOCARDIUM SP., JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
206. SERRIPES GROENLANDICUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
207. SPISULA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
208. MACTRA ALASKANA	0	6	0	0	0	0	0	0	0	1	0	0	0	0	2
209. MACTRA NASUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
210. SILIQUA PATULA	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
211. MACOMA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
212. MACOMA MOESTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
213. MACOMA MOESTA ALASKANA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
214. MACOMA CRASSULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
215. MACOMA LAMA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
216. MACOMA BALTHICA	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
217. MACOMA CF. BALTHICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
218. MACOMA CF. CALCAREA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
219. MACOMA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
220. TELLINA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
221. TELLINA NUCULOIDES	0	7	1	0	0	0	0	0	0	0	0	1	0	0	0
222. SAXIDOMUS GIGANTEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
223. PSEPHIDIA LORDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24
224. HUMILARIA KENNERLYI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225. PATINOPECTEN CAUIRUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
226. MYA SP.	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
227. HIATELLA ARCTICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
228. LYONSIA CALIFORNICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
229. THRACIA SP. ,	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
230. DECAPODA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
231. CARIDEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
232. PAGURIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
233. MAJIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
234. OROGONIA GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
235. CHIONIECETES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
236. CANCRIDAE	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
237. PINNOTHERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
238. SIPUNCULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
239. ALCYONIDIUM SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
240. ASTERIAS AMURENSIS	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
241. OPHIUROIDEA	0	1	0	0	0	0	0	0	0	0	0	0	0	0	7
242. STRONGYLOCENTROTUS DROEBACHIENSIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
243. DENDRASTER EXCENTRICUS	0	37	6	4	0	5	5	4	6	2	0	12	5	0	20
244. SPATANGIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPEND X
(continued)

SAMPLES

SPECIES	06/10/16/1	06/10/30/1	06/10/50/1	06/11/15/1	06/11/15/2	06/11/30/1	06/11/30/2	06/11/30/3	06/11/50/1	06/11/50/2	06/11/50/3	06/11/50/4	06/11/50/5	08/A4/30/1	08/01/60/1
MONTH	06	06	06	06	06	06	06	06	06	06	06	06	06	08	08
TRANSECT	10	10	10	11	11	11	11	11	11	11	11	11	11	A4	01
DEPTH	16	30	50	15	15	30	30	30	50	50	50	50	50	30	60
REPLICATE	1	1	1	1	2	1	2	3	1	2	3	4	5	1	1
245. DENDROCHIROTIDA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
246. HOLOTHUROIDEA DENDROCHIROTACEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
247. HAVELOCKIA SP. B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
248. THYONINAE A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
249. EUPENTACTA QUINQUESEMITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250. PENTAMERA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
251. PENTAMERA LISSOPLACA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
252. PENTAMERA SP. B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
253. CHIRIDOTIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
254. CHIRIDOTA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255. MYRIOTRHOCHIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
256. HEMICHORDATA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
257. UROCHORDATA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
258. DISTAPLIA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.00	0.00	0.00
259. AGNESIA SEPTENTRIONALIS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	6.00	0.00	1.00	0.00	0.00
260. STYELA ?CORIACEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
261. HALOCYNTHIA AURANTIUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
262. AMMODYTES HEXAPTERUS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.00	0.00	0.00
263. NSPECIES	11.0	31.0	28.0	4.0	10.0	9.0	14.0	24.0	29.0	24.0	27.0	33.0	11.0	17.0	43.0
264. H	1.92	2.64	2.50	0.91	2.06	.84	1.43	2.07	1.68	1.48	1.48	.949	.324	1.50	2.38
265. EVENNESS	.802	.768	.749	.657	.895	.61	.542	.652	.497	.467	.448	.272	.342	.131	.614
266. TOTAB	122.	391.	129.	31.0	21.0	449.	388.	623.	342.	245.	470.	1110	1018	109.	505.

APPENDIX D

(continued)

SAMPLES

MONTH	08	08	08	08	08	08	08	08	10	10	10	10	10	10	10
TRANSECT	01	02	03	04	06	07	08	09	02	02	02	02	03	03	03
DEPTH	60	60	60	60	60	60	60	60	30	30	60	60	30	30	60
REPLICATE	2	1	1	1	1	1	1	1	1	2	1	2	1	2	1
SPECIES															
1. CNIDARIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. PANDEA SP. 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. TIMA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. ANTHOZOA	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0
5. PLATYHELMINTHES	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
6. NEMERTINEA	9	1	11	14	5	33	25	6	0	0	1	1	0	1	6
7. NEMATODA	0	0	1	0	0	1	0	0	0	2	0	0	0	0	0
8. POLYCHAETA	0	0	0	0	0	0	0	32	0	0	0	13	0	0	0
9. POLYNOIDAE	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
10. ARCTEOBIA ANTICOSTIENSIS	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
11. EUNOE CIRROSA	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
12. HARMOTHOE EXTENUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13. HARMOTHOE MULTISETOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14. LEPIDONOTUS SQUAMATUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15. SIGALIONIDAE	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. PHOLOE MINUTA	1	0	1	27	1	3	1	1	0	0	0	0	0	0	0
17. SIGALION SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18. PISIONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19. PHYLLODOCIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20. ANAITIDES GROENLANDICA	0	0	0	0	1	0	0	0	1	3	0	0	0	0	0
21. ANAITIDES MUCOSA	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0
22. ANAITIDES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23. ETEONE SP.	0	0	0	0	0	0	0	0	0	9	1	0	0	0	0
24. ETEONE LONGA	0	0	1	1	0	1	7	10	0	7	0	3	3	2	4
25. EULALIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26. MYSTA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27. MYSTA BARBATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28. HESIONURA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29. HESIONIDAE	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2
30. HESIONIDAE, JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
31. SYLLIDAE	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
32. AUTOLYTUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
33. TYPOSYLLIS SP.	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0
34. EUSYLLIS BLOMSTRANDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35. EXOGONE SP.	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
36. SPHAEROSYLLIS SP.	0	0	0	0	0	0	0	0	0	11	0	4	0	0	0
37. BRANIA SP.	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
38. NEREIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39. NEREIS SP.	0	0	0	0	0	0	0	1	0	0	0	0	2	3	0
40. NEPHTYS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41. NEPHTYS CILIATA	0	0	1	0	0	0	0	0	0	0	0	0	0	7	0
42. NEPHTYS CAECA	0	0	0	0	0	0	0	0	0	0	0	0	4	1	1
43. NEPHTYS RICKETTSII	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
44. NEPHTYS LONGOSETOSA	4	0	9	13	1	0	0	0	0	0	3	0	0	1	0
45. NEPHTYS FERRUGINEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
46. SPHAERODOROPSIS MINUTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47. GLYCERA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48. GLYCERA CAPITATA	1	0	0	0	4	0	3	2	0	10	1	5	0	3	7

APPENDIX D
(continued)

SPECIES	08 01 60 2	08 02 60 1	08 03 60 1	08 04 60 1	08 06 60 1	08 07 60 1	08 08 60 1	08 09 60 1	10 02 30 1	10 02 30 2	10 02 60 1	10 02 60 2	OF-JO -OF-J.-II	10 03 30 2	10 03 60 1
49. GONIADIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50. GLYCINDE PICTA	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51. GLYCINDE ARMIGERA	3	0	0	7	0	3	0	4	0	0	0	1	0	0	0
52. ONUPHIS IRIDESCENS	1	0	0	2	0	3	0	0	0	0	0	2	0	0	0
53. LUMBRINERIS SP.	1	0	1	21	0	0	0	0	0	0	0	1	0	0	0
54. LUMBRINERIS BICIRRATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55. DORVILLEIDAE	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
56. PROTODORVILLEA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57. OPHRYOTROCHA SP.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
58. SCHISTOMERINGOS CAECA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59. SCHISTOMERINGOS ANNULATA	0	0	0	0	0	0	0	0	0	0	0	0	-	0	*
60. SCOLOPLOS ARMIGER	2	1	16	3	8	0	1	31	0	-	0	0	2	8	
61. SCOLOPLOS ARMECEPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62. PARAONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63. ARICIDEA NR. SUECICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64. ARICIDEA LOPEZI LOPEZI	0	0	0	0	0	-	3	0	0	0	0	0	0	0	0
65. ARICEDEA SP. A	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
66. PARAONELLA PLATYBRANCHIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67. APISTOBRANCHUS TULLBERGI	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
68. SPIONIDAE	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0
69. SPIONIDAE GEN NOV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70. POLYDORA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71. POLYDORA SOCIALIS	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
72. POLYDORA CAULLERYI	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
73. GATTYANA CIRROSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74. PRIONOSPIO STEENSTRUPI	1	0	2	1	0	0	0	1	0	0	3	0	0	0	1
75. SPIO SP.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
76. SPIO NR FILICORNIS	1	0	9	0	0	0	2	10	0	0	4	27	1	0	2
77. SPIOPHANES? SP.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
78. SPIOPHANES BOMBYX	39	0	65	50	27	15	351	321	0	3	1	3	8	10	15
79. SPIOPHANES BERKELEYORUM	0	0	1	85	0	0	0	0	0	0	0	0	0	0	0
80. SCOLELEPIS SQUAMATA	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
81. MINUSPIO CIRRIFERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82. MAGELONA NR CERAE	7	0	9	9	0	10	0	9	0	0	0	0	1	0	0
83. MAGELONA SACCULATA	0	0	2	0	0	0	0	1	0	0	0	0	3	0	0
84. CHAETOPTERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85. CHAETOPTERUS VARIOPEDATUS	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
86. SPIOCHAETOPTERUS SP.	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
87. SPIOCHAETOPTERUS COSTARUM	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0
88. CIRRATULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89. CIRRATULUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90. THARYX SP.	2	0	2	2	0	0	0	2	0	0	0	0	0	0	0
91. CHAETOZONE SETOSA	7	0	3	2	0	1	0	1	0	0	0	0	0	0	0
92. FLABELLIGERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93. BRADA VILLOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
94. PHERUSA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95. PHERUSA PLUMOSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96. ARMANDIA BREVIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97. OPHELIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES	08 01 60 2	08 02 60 1	08 03 60 1	08 04 60 1	08 06 60 1	08 07 60 1	08 08 60 1	08 09 60 1	10 02 30 1	10 02 30 2	10 02 60 1	10 02 60 2	10 03 30 1	10 03 30 2	10 06 6 1
MONTH / TRANSECT / DEPTH / REPLICATE															
98. OPHELIA LIMACINA	0	0	16	0	2	20	9	1'	0	3	0	2	2	12	10
99. TRAVISIA SP.	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
100. TRAVISIA FORBESII	0	0	0	0	3	1	25	0	0	0	0	0	0	3	0
101. TRAVISIA PUPA	0	0	0	0	0	1	0	.	0	0	0	0	0	0	0
102. OPHELINA BREVIATA	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0
103. CAPITELLA CAPITATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104. NOTOMASTUS LINEATUS	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
105. MEDIOMASTUS CALIFORNIENSIS	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
106. DECAMASTUS GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107. BARONTOLLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108. MALDANIDAE	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
109. PRAXILLELLA SP.	3	0	2	21	0	0	0	0	0	0	0	0	0	0	2
110. RHODINE BIRORQUATA	0			0	0	0		3	0	0	0	0		0	0
111. OWENIA FUSIFORMIS	0	0	0	1	2	1	0	0	23	58	2	·3	0	0	1
112. MYRIOCHELE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113. MYRIOCHELE OCULATA	0	0	0	3	3	12	0	0	0	0	5	0	0	0	0
114. PECTINARIIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115. CISTENIDES GRANULATA	1	0	0	0	28	1	0	1	0	0	1	0	0	1	1
116. AMPHARETIDAE	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0
117. AMPHARETE SP.	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
118. AMPHARETE GOESI	0	0	0	0	0.-1	0	0	0	0	0	0	0	0	0	0
119. AMPHARE CF ACUTIFRONS	0	0	14	5	0	13	13	23	0	1	2	0	4	0	4
120. ASABELLIDES SIBIRICA	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
121. TEREBELLIDAE	0	0	0	0	0	0	0	0	0	0	3	4	0	0	0
122. LEAENA ABRANCHIATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
123. NICOLEA ZOSTERICOLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
124. PISTA CRISTATA	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1
125. POLYCIRRUS SP.	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0
126. LANASSA VENUSTA VENUSTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
127. LAPHANIA BOECKI	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
128. PROCLEA GRAFFII	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129. SABELLIDAE	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
130. CHONE SP.	0	0	1	0		0	0	0	0	0	0	0	0	0	0
131. CHONE GRACILIS	0	0	0	0	0	0	0		0	1	0	0			0
132. CHONE MAGNA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133. EUCHONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
134. EUCHONE ANALIS	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
135. EUCHONE HANCOCKI	23	0	21	0	0	0	0	0	0	0	0	0	0	0	0
136. EUCHONE ARENAE	0	0	0	0	0	0	12	0	0	0	1	87	0	0	1
137. POTAMILLA RENIFORMIS	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
138. SABELLA MEDIA	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
139. SERPULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
140. POLYGORDIUS SP.	0	0	0	0	0	0	7	.	0	6	0	11	0	-	1
141. OLIGOCHAETA	1	0	0	0	0	0	0	0	0	24	0	0	0	0	0
142. HIRUDINEA	0		0	0		0	0	0	0	0	0	0	0		0
143. MOLLUSCA	0	0	0	0	0	0	0	0	0	0	0	0	0		0
144. GASTROPODA	0	0	3	0	0	0	0	0		0	0	0	0	0	0
145. LEPETA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146. MARGARITES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES		08	08	08	08	08	08	08	08	10	10	10	10	10	10	10
	TRANSECT	01	02	03	04	06	07	08	09	02	02	02	02	03	03	03
	DEPTH	60	60	60	60	60	60	60	60	30	30	60	60	30	30	60
	REPLICATE	2	1	1	1	1	1	1	1	1	2	1	2	1	2	1
147. MARGARITES CF. HELICINUS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
148. MARGARITES COSTALIS		0	0	2	0	0	0	0	. 4	0	0	0	0	0	1	1
149. LITTORINA SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150. TACHYRHYNCHUS EROSUS		0	0	0	2	0	0	0	0	0	0	0	2	0	0	0
151. TRICHOTROPIS CANCELLATA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
152. MARSENIA CF. RHOMBICA		0	0	0	0	0	-	0	0	0	-	0	0	0	0	0
153. NATICA CLAUSA		0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
154. POLINICES SP.		0	1	0	0	0	0	2	0	0	0	0	0	0	3	0
155. TURRIDAE, JUV.		0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
156. SUAVODRILLIA KENNICOTTII		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
157. MANGELIA? SP. A		0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
158. OENOPOTA SP.			0	0	0	0		0		0	0		0	0	0	
159. OENOPOTA CF. TURRICULA		0	0	0	0	0	7	2	3	0	0	0	1	0		0
160. OENOPOTA CF. ARCTICA		3	-	0	0	0	4	0	1	0	0	1	0	0	0	0
161. OENOPOTA SP. A		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162. KURTSIELLA PLUMBAE		0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
163. TURRIDAE SP. A		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
164. ODOSTOMIA SP.		0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
165. TURBONILLA SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
166. CEPHALASPIDEA		0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
167. CYLICHNA SP.		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
168. CYLICHNA ALBA		0	0	1	0	0	0	0	3	0	0	0	0	2	0	
169. CYLICHNA? SP. A		1	0	0	0	0	0	0	0			0	0	0	0	0
170. SCAPHANDER SP. A		1		0	0	0	0	0	0			0	0	0	0	0
171. PHILINE SP. A		0	0	0	0	0	1	0	0	0	0	0	0		0	0
172. PHILINE SP. B		0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
173. DIAPHANA MINUTA		0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
174. HAMINOEA SP. A		0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
175. RETUSA SP. A		0	0	0	3	0	1	0	0	0	0	0	0	0	0	0
176. RETUSA SP. B		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177. NUDIBRANCHIA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
178. NEAEROMYA COMPRESSA		0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
179. BIVALVIA		0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
180. NUCULA TENUIS		2	0		16		0	0	0		3	0	0	0	0	
181. NUCULANA SP.		0	0	0	0	0			0	0	0	0	0	0	0	0
182. NUCULANA CF. FERNULA		0	0	0	0	.	0	0	0	0		0	0			0
183. YOLDIA CF. HYPERBOREA		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
184. YOLDIA MYALIS		0	0	0	0	0	0	0	0	0	0	0	9	0	0	0
185. YOLDIA SCISSURATA		0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
186. MYTILIDAE		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
187. MEGACRENELLA COLUMBIANA		0	0	.	0	0	0	0	0	0	0	0	. -	0	0	0
188. MUSCULUS SP. JUV.		0	0	0	0	0	0	0	0	0	0	0	$	0	0	0
189. MUSCULUS NIGER		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190. MUSCULUS CF. DISCORS		0	0	0	0	0	0	0	0	0	0	0	0	0	0	
191. MODIOLUS SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
192. LIMA SP.		0	0	0	0				0	0	0	0		0	0	0
193. LIMATULA SP.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
194. LIMATULA SUBAURICULATA		0	0	0	0	0	0	0	0	0	0	0	1		0	2
195. LIMATULA CF. ATTENUATA		0		0	0	0	0	0	0	0	0	0	0	0		0

APPENDIX D

SAMPLES

(continued)

	MONTH	08	08	08	08	08	08	08	08	10	10	10	10	10	10	10
	TRANSECT	01	02	03	04	06	07	08	09	02	02	02	02	03	03	03
	DEPTH	60	60	60	60	60	60	60	60	30	30	60	60	30	30	60
	REPLICATE	2	1	1	1	1	1	1	1	1	2	1	2	1	2	1
	SPECIES															
196.	AXINOPSIDA SERRICATA	12	0	6	14	0	1	0	0	0	0	0	0	0	0	0
197.	DIPLODONTA CF. IMPO	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
198.	CYCLOCARDIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
199,	MYSELLA CF. TUMIDA	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
200.	CYCLOCARDIA CREBRICOSTATA	0	19	5	0	10	1	2	6	0	0	7	11	57	18	1
201.	CYCLOCARDIA INCISA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
202.	ASTARTE SP., JUV.	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
203,	ASTARTE ROLLANDI	0	2	0	0	6	0	0	0	3	2	0	0	7	4	2
2040	ASTARTE CF. VERNICOSA	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
205.	CLINOCARDIUM SP., JUV.	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
206.	SERRIPES GROENLANDICUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
207,	SPISULA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
208,	MACTRA ALASKANA	2	0	3	2	0	i	0	2	0	0	0	0	0	0	0
209.	MACTRA NASUATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
210.	SILIQUA PATULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
211.	MACOMA SP.	0	0	3	5	0	0	0	0	0	1	0	0	0	0	0
212.	MACOMA MOESTA	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
213.	MACOMA MOESTA ALASKANA	5	0	4	7	0	0	0	0	0	0	0	0	0	0	0
214.	MACOMA CRASSULA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
215.	MACOMA LAMA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
216.	MACOMA BALTHICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
217*	MACOMA CF. BALTHICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
218.	HACOMA CF.CALCAREA	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
219.	MACOMA SP. A	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0
220.	TELLINA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
221,	TELLINA NUCULOIDES	1	0	0	0	0	1	19	0	0	0	0	0	0	1	0
222.	SAXIDOMUS GIGANTEA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
223.	PSEPHIDIA LORDI	7	0	5	0	0	0	0	0	0	0	0	2	0	0	0
224 ,	HUMILARIA KENNERLYI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225*	PATINOPECTEN CAUIRUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
226.	MYA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
227.	HIATELLA ARCTICA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
228.	LYONSIA CALIFORNIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
229.	THRACIA SP. ,	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
230,	DECAPODA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
231,	CARIDEA	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1
232.	PAGURIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
233.	MAJIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
234,	OROGONIA GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
235,	CHIONIECETES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
236.	CANCRIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
237.	PINNOTHERIDAE	0	()	1	2	0	0	0	0	()	0	0	0	0	0	0
238.	SIPUNCULA	0	0	2	2	0	0	0	0	0	0	1	2	0	0	0
239.	ALCYONIDIUM SP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
240.	ASTERIAS AMURENSIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
241.	OPHIUROIDEA	0	0	10	19	1	4	1	1	0	0	0	8	0	0	0
242.	STRONGYLOCENTROTUS DROEBACHIENSIS	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1
243.	DENDRASTER EXCENTRICUS	7	0	88	0	4	16	0	5	0	0	0	36	19	35	4
244.	SPATANGIDAE	0	0	0	0	0	0	0	()	0	3	0	0	0	0	0

APPENDIX D

(continued)

SPECIES									SAMPLES							
	MONTH	08	08	08	08	08	08	08	08	10	10	10	10	10	10	10
	TRANSECT	01	02	03	04	06	07	08	09	02	02	02	02	03	03	03
	DEPTH	60	60	60	60	60	60	60	60	30	30	60	60	30	30	60
	REPLICATE	2	1	1	1	1	1	1	1	1	2	1	2	1	2	1
		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
245.	DENDROCHIROTIDA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
246.	HOLOTHUROIDEA DENDROCHIROTACEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
247.	HAVELOCKIA SP. B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
248.	THYONINAE A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
249.	EUPENTACTA QUINQUESEMITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250.	PENTAMERA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
251.	PENTAMERA LISSOPLACA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
252.	PENTAMERA SP. B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
253.	CHIRIDOTIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
254.	CHIRIDOTA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255.	MYRIOTRHOCHIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
256.	HEMICHORDATA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
257.	UROCHORDATA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
258.	DISTAPLIA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
259.	AGNESIA SEPTENTRIONALIS	0.00	0.00	0.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
260.	STYELA ?CORIACEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
261.	HALOCYNTHIA AURANTIUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
262.	AMMODYTES HEXAPTERUS	37.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
263.	NSPECIES	27.0	8.00	49.0	42.0	22.0	33.0	24.0	33.0	3.00	24.[illegible]	24.0	39.0	21.0	22.0	25.0
264.	H	.84	1.40	2.88	2.89	2.45	2.21	1.43	1.66	.503	2.3[illegible]	2.[illegible]4	2.60	2.12	2.40	2.8[illegible]
265.	EVENNESS	.786	.672	.739	.772	.792	.633	0.45	.474	.458	.73[illegible]	.9[illegible]6	.711	.696	.[illegible]77	.[illegible]7
266.	TOTAB	157.	32.0	356.	372.	121.	272.	508.	502.	27.0	159.	47.0	269.	138.	1[illegible]8.	77.0

APPENDIX D

(continued)

SAMPLES

SPECIES													
MONTH	10	10	10	10	1.0	10	10	10	10	10	10	10	10
TRANSECT	03	04	04	04	04	06	06	06	06	07	07	11	11
DEPTH	6 0	30	30	60	60	30	30	60	60	30	30	60	60
REFLICATE	2	1	2	1	?	1	2	1	2	1	2	1	2
1. CNIDARIA	0	0	0	0	0	0	0	0	0	0	0	0	0
2. FANDEA SF. 1	0	0	0	0	0	0	0	0	0	0	0	0	0
3. TIMA SF'.	0	0	0	0	0	0	0	0	0	0	0	0	0
4, ANTHOZOA	0	0	0	3	1	0	0	0	0	1	0	0	0
5. PLATYHELMINTHES	0	0	0	0	0	0	0	0	0	0	0	0	0
6. NEMERTINEA	1	12	8	32	24	0	1	31	45	6	1	2	13
7. NEMATODA	0	1	0	1	0	0	0	3	1	0	0	0	4
8. POLYCHAETA	0	0	0	0	0	0	0	0	0	0	0	0	0
9, POLYNOIDAE	0	0	0	0	0	0	0	0	0	0	0	0	3
10. ARCTEOBIA ANTICOSTIENSIS	0	0	0	0	0	0	0	0	0	0	0	0	0
11. EUNOE CIRROSA	0	0	0	0	0	0	0	0	0	0	0	0	0
12. HARMOTHOE EXTENUATA	0	0	0	0	0	0	0	0	0	0	0	0	0
13. HARMOTHOE MULTISETOSA	0	0	0	0	0	0	0	0	0	0	0	0	0
14. LEPIDONOTUS SQUAMATUS	0	0	0	0	0	0	0	0	0	0	0	0	0
15. SIGALIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
16, PHOLOE MINUTA	0	3	6	16	8	0	0	3	2	0	0	0	5
17. SIGALION SF.	0	0	0	1	o	0	0	1	0	0	0	0	0
18. PISIONE SF.	0	0	0	0	0	0	0	0	0	0	0	0	0
19. PHYLLODOCIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
20. ANAITIDES GROENLANDICA	0	0	1	0	0	0	0	0	0	0	0	0	0
21. ANAITIDES MUCOSA	0	1	1	0	0	0	0	0	3	0	0	0	5
22. ANAITIDES SF.	0	0	0	0	0	0	0	0	0	0	0	0	0
23. ETEONE SF.	0	0	2	2	0	0	0	0	0	0	0	0	0
24. ETEONE LONGA	3	1	0	4	4	0	0	1	1	1	1	1	7
25.EULALIA SF',	0	0	0	0	0	0	0	0	0	1	0	0	0
26. MYSTA SF'.	0	0	0	0	0	0	0	0	0	0	0	0	0
27. MYSTA BARBATA	0	0	0	0	0	0	0	0	0	0	0	0	0
28. HESIONURA SF.	0	0	0	0	0	0	0	0	0	0	0	0	0
29. HESIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
300 HESIONIDAE,JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0
31. SYLLIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
32. AUTOLYTUS SF.	0	0	0	0	0	0	0	0	0	0	0	0	0
33. TYPOSYLLIS SF.	0	0	0	0	0	0	0	0	0	0	1	0	0
34. EUSYLLIS BLOMSTRANDI	0	0	0	0	0	0	0	0	0	0	0	1	3
35.EXOGONE SF.	0	0	0	0	0	0	0	0	0	0	0	0	2
36. SPHAEROSYLLIS SF.	0	0	0	0	0	0	0	0	0	0	0	0	0
37.BRANIA SF'.	0	0	0	0	0	0	0	0	O	0	0	0	0
38. NEREIDAE	0	0	0	0	0	0	0	0	0	0	0	0	1
39. NEREIS SF.	0	0	1	3	1	0	0	0	0	0	0	0	0
40, NEPHTYS SF'.	0	4	0	0	2	0	0	0	0	0	0	0	0
41. NEPHTYS CILIATA	0	0	0	0	o	0	0	0	0	0	0	0	0
42. NEPHTYS CAECA	1	3	1	1	0	0	0	0	0	0	0	1	0
43, NEPHTYS RICKETTSII	0	0	0	0	0	0	0	0	0	0	0	0	0
44. NEPHTYS LONGOSETOSA	14	3	1	3	0	0	0	0	3	0	0	0	0
45. NEPHTYS FERRUGINEA	0	0	0	0	0	0	0	0	0	0	0	0	0
46. SPHAERODOROPSIS MINUTA	0	0	0	0	0	0	0	0	0	0	0	0	0
47, GLYCERA SF.	0	0	0	0	0	0	0	0	0	0	0	0	0
48. GLYCERA CAPITATA	3	()	()	3	0	2	4	1	1	2	6	3	4

APPENDIX D

(continued)

SAMPLES

SPECIES													
MONTH	10	10	10	10	10	10	10	10	10	10	10	10	10
TRANSECT	03	04	04	04	04	06	06	06	06	07	07	11	11
DEPTH	60	30	30	60	60	30	30	60	60	30	30	60	60
REPLICATE	2	1	2	1	2	1	2	1	2	1	2	1	2
49, GONIADIDAE	0	0	0	0	0	0	0	1	0	0	0	0	0
50, GLYCINDE PICTA	0	0	0	0	1	0	0	0	0	0	0	0	0
51. GLYCINDE ARMIGERA	0	0	0	12	7	0	0	4	1	0	0	2	0
52. ONUPHIS IRIDESCENS	1	0	0	3	1	0	0	0	0	0	0	0	0
53.LUMBRINERIS SP',	0	0	0	12	9	0	0	1	0	0	0	0	0
54. LUMBRINERIS BICIRRATA	0	0	0	0	0	0	0	0	1	0	0	0	0
55. DORVILLEIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
56. PROTODORVILLEA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
57. OPHRYOTROCHA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
58. SCHISTOMERINGOS CAECA	0	0	0	0	0	0	0	0	0	0	0	0	0
59. SCHISTOMERINGOS ANNULATA	0	0	0	0	0	0	0	0	0	0	0	0	0
60. SCOLOPLOS ARMIGER	5	41	26	13	7	7	10	2	8	2	5	4	1
61. SCOLOPLOS ARMECEPS	0	0	0	0	0	26	0	0	0	0	4	0	0
62. PARAONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
63, ARICIDEA NR. SUECICA	0	0	0	6	0	0	0	0	0	0	0	0	0
64. ARICIDEA LOPEZI LOPEZI	0	. 1	0	0	0	0	0	0	2	0	0	0	0
65. ARICEDEA SP. A	o	0	0	0	0	0	0	0	0	0	0	0	2
66. PARAONELLA PLATYBRANCHIA	0	0	0	0	0	0	0	1	0	0	0	0	0
67. APISTOBRANCHUS TULLBERGI	0	0	0	0	0	0	0	0	0	0	0	0	0
68. SPIONIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
69.SPIONIDAE GEN NOV	0	0	0	0	0	0	0	0	0	0	0	0	0
70. POLYDORA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
710 POLYDORA SOCIALIS	0	0	0	0	0	0	0	0	0	0	0	0	0
72. POLYDORA CAULLERYI	0	0	0	0	0	0	0	0	0	0	0	0	0
73, GATTYANA CIRROSA	0	0	0	0	0	0	0	0	0	0	0	0	0
74, PRIONOSPIO STEENSTRUPI	2	0	0	4	8	3	3	1	0	0	0	0	1
75. SPIO SP.	o	0	0	0	0	0	0	0	0	0	0	0	0
76, SPIO NR FILICORNIS	0	2	1	0	0	0	0	8	7	0	0	3	9
77, SPIOPHANES? SP.	0	o	0	0	0	0	0	0	0	0	0	0	0
78. SPIOPHANES BOMBYX	29	· 0	0	141	138	0	0	2199	1482	1	1	78	313
79, SPIOPHANES BERKELEYORUM	0	0	0	32	5	0	0	0	0	0	0	0	0
80. SCOLELEPIS SQUAMATA	0	58	19	0	0	0	0	1	0	0	0	0	0
81. MINUSPIO CIRRIFERA	0	0	0	0	0	0	0	0	0	0	0	0	0
82. MAGELONA NR CERAE	0	0	1	22	4	0	0	0	1	0	0	0	3
83. MAGELONA SACCULATA	0	140	79	1	0	0	0	4	9	0	0	0	0
84. CHAETOPTERIDAE	0	0	0	0	0	0	0	0	0	0	0	0	2
85. CHAETOPTERUS VARIOPEDATUS	0	0	0	0	1	0	0	0	0	0	0	2	0
86. SP1OCHAETOP'TERUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
87. SPIOCHAETOPTERUS COSTARUM	0	0	0	0	0	0	0	0	0	0	0	0	0
88. CIRRATULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
89. CIRRATULUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
90. THARYX SP.	1	0	0	3	5	0	0	0	0	0	0	0	1
91. CHAETOZONE SETOSA	0	287	190	3	2	0	0	3	7	0	0	2	0
92 FLABELLIGERIDAE	0	0	0	0	o	0	0	0	0	0	0	0	0
93. BRADA VILLOSA	0	0	0	0	0	0	0	0	0	0	i	0	0
94. PHERUSA SF.	0	0	0	0	0	0	0	()	0	()	0	0	0
95. PHERUSA PLUMOSA	0	0	0	0	0	0	0	0	0	0	0	0	0
96. ARMANDIA BREVIS	0	0	0	0	0	0	0	0	0	0	0	0	0
S'7, OPHELIA SP'.	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPL≤S

SPECIES													
MONTH	10	10	10	10	10	10	10	10	10	10	10	10	10
TRANSECT	03	04	04	04	04	06	06	06	06	07	07	11	11
DEPTH	60	30	30	60	60	30	30	60	60	30	30	60	60
REPLICATE	2	1	2	1	2	1	2	1	2	1	2	1	2
98. OPHELIA LIMACINA	1	0	0	0	0	0	3	12	29	0	2	5	12
99. TRAVISIA SP.	0	0	0	0	0	0	0	1	0	0	0	0	0
100. TRAVISIA FORBESII	0	0	0	1	0	0	0	1	0	0	1	1	1
101. TRAVISIA PUPA	0	0	1	0	0	0	0	0	0	1	0	0	0
102. OPHELINA BREVIATA	0	0	0	0	0	0	0	0	0	0	0	0	0
103. CAPITELLA CAPITATA	0	0	0	0	0	0	0	0	0	0	0	0	0
104. NOTOMASTUS LINEATUS	0	0	0	0	0	0	0	0	0	0	0	0	1
105. MEDIOMASTUS CALIFORNIENSIS	0	1	2	34	25	0	0	0	1	0	0	0	0
106. DECAMASTUS GRACILIS	0	0	0	18	9	0	0	0	1	0	0	0	0
107. BARONTOLLA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
108. MALDANIDAE	0	1	0	0	0	0	0	2	2	0	0	0	2
109. PRAXILLELLA SP	2	0	1	31	28	0	0	0	0	0	0	0	13
110. RHODINE BIRORQUATA	0	0	0	0	0	0	0	0	0	0	0	0	0
111. OWENIA FUSIFORMIS	1	0	0	0	0	5	5	0	0	12	15	3	1
112. MYRIOCHELE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
113. MYRIOCHEL≤ OCULATA	1	2	0	35	40	0	0	7	3	0	0	0	0
114. PECTINARIIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
115. CISTENIDES GRANULATA	0	0	0	0	0	2	1	0	0	0	0	3	1
116. AMPHARETIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
117. AMPHARET≤ SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
118. AMPHARET≤ GOESI	0	0	0	0	0	0	0	0	0	0	0	0	0
119. AMPHARE CF ACUTIFRONS	-	12	14	13	14	0	0	3	4	0	5	0	3
120. ASABELLIDES SIBIRICA	0	0	0	0	0	0	0	0	0	0	0	0	0
121. TEREBELLIDAE	0	0	2	0	0	0	0	0	0	0	0	0	0
122. LEAENA ABRANCHIATA	0	0	0	0	0	0	0	0	0	0	0	0	0
123. NICOLEA ZOSTERICOLA	0	0	0	0	0	0	0	0	1	0	0	0	5
124. PISTA CRISTATA	0	0	0	0	0	0	0	0	0	0	0	0	0
125. POLYCIRRUS SP.	0	0	1	0	0	0	0	0	0	0	0	0	0
126. LANASSA VENUSTA VENUSTA	0	0	0	0	0	0	0	0	0	0	0	0	0
127. LAPHANIA BOECKI	4	0	0	4	4	0	0	0	0	0	0	0	0
128. PROCLEA GRAFFII	1	0	0	0	0	0	0	1	0	2	0	0	0
129. SABELLIDAE	0	. -	0	0	0	0	0	0	0	0	0	1	4
130. CHONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
131. CHONE GRACILIS	0	0	0	0	0	0	0	0	2	0	0	0	0
132. CHONE MAGNA	0	0	0	0	0	0	0	0	0	0	0	0	0
133. EUCHONE SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
134. EUCHONE ANALIS	0			0			0	0			0		0
135. EUCHONE HANCOCKI	0	0	0	0	0	0	0	1	0	0	0	0	0
136. EUCHONE ARENAE	0	0	0	0	0	0	0	2	0	0	0	0	1
137. POTAMILLA RENIFORMIS	0	0	0	0	0	0	0	0	0	0	0	0	0
138. SABELLA MEDIA	0	0	0	0	0	0	0	0	0	0	0	0	2
139. SERPULIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
140. POLYGORDIUS SP.	0	0	0	0	0	0	2	0	0	0	0	0	17
141. OLIGOCHAETA	0	0	0	0	0	0	0	0	0	0	0	0	0
142. HIRUDINEA	0	0	0	0	0	0	0	0	0	0	0	0	0
143. MOLLUSCA	0	0	0	0	0	0	0	0	0	0	0	0	1
144. GASTROPODA	0	0	0	0	0	0	0	0	0	0	0	0	0
145. LEPETA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0
146. MARGARITES SP.	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES													
MONTH	10	10	10	10	10	H0	10	10	1 0-40	10	10	10	0
TRANSECT	03	04	04	04	04	e6	06	06	0	07	07	11	1
DEPTH	60	30	30	60	60	m0	30	60	6	30	30	60	0
REPLICATE	2	1	2	1	2	?-i	2	1	2	1	2	1	.-ii-$ +r.j
147. MARGARITES CF. HELICINUS	0	0	0	0	0	0	0	0	0	0	0	0	0
148. MARGARITES COSTALIS	1	14	7	0	0	0	0	0	0	0	0	2	0
149. LITTORINA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
150. TACHYRHYNCHUS EROSUS	0	0	0	1	0	0	0	0	0	0	0	0	0
151. TRICHOTROPIS CANCELLATA	0	0	1	0	0	0	0	0	0	0	0	0	0
152. MARSENIA CF. RHOMBICA	0	0	0	0	0	0	0	0	0	0	0	0	0
153. NATICA CLAUSA	0	2	1	0	0	0	0	0	0	0	0	0	1
154. POLINICES SP.	0	0	0	0	0	0	0	0	0	0	1	1	0
155. TURRIDAE, JUV.	0	6	3	1	0	0	0	0	0	0	0	0	0
156. SUAVODRILLIA KENNICOTTII	0	0	0	1	0	0	0	0	0	0	0	0	0
157. MANGELIA? SP. A	0	0	0	1	0	0	0	0	0	0	0	0	0
158. OENOPOTA SP.	0	0	0	0	0	0	0	0	5	0	0	0	0
159. OENOPOTA CF. TURRICULA	0	2	3	0	0	0	0	0	0	0	0	3	2
160. OENOPOTA CF. ARCTICA	0	4	1	1	0	0	0	0	0	0	0	0	0
161. OENOPOTA SP. A	0	0	0	0	0	0	0	0	1	0	0	0	0
162. KURTSIELLA PLUMBAE	0	7	0	7	3	0	0	5	0	0	0	0	0
163. TURRIDAE SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0
164. ODOSTOMIA SP.	0	0	0	2	0	0	0	0	0	0	0	0	0
165. TURBONILLA SP.	0	0	0	2	0	0	0	0	0	0	0	0	0
166. CEPHALASPIDEA	0	0	0	0	0	0	0	0	0	0	0	0	0
167. CYLICHNA SP.	0	0	0	6	0	0	0	0	0	0	0	0	0
168. CYLICHNA ALBA	0	5	0	0	3	0	0	1	0	0	0	0	0
169. CYLICHNA? SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0
170. SCAPHANDER SP. A	0	0	0	0	0	0	0	1	1	0	0	0	0
171. PHILINE SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0
172. PHILINE SP. B	0	0	0	0	0	0	0	0	0	0	0	0	0
173. DIAPHANA MINUTA	0	0	0	0	0	0	0	0	0	0	0	0	0
174. HAMINOEA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	0
175. RETUSA SP. A	0	0	0	0	0	0	0	0	0	0	0	0	1
176. RETUSA SP. B	0	0	0	5	2	0	0	0	0	0	0	0	0
177. NUDIBRANCHIA	0	0	0	0	0	0	0	0	0	0	0	0	0
178. NEAEROMYA COMPRESSA	0	0	0	0	0	0	0	0	0	0	0	0	0
179. BIVALVIA	0	0	0	0	0	0	0	0	0	0	0	3	0
180. NUCULA TENUIS	0	0	0	34	13	0	0	2	0	0	0	0	0
181. NUCULANA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
182. NUCULANA CF. PERNULA	0	0	0	0	0	0	0	0	0	0	0	0	0
183. YOLDIA CF. HYPERBOREA	0	0	0	2	0	0	0	0	0	0	0	0	0
184. YOLDIA MYALIS	0	0	0	0	0	0	0	0	0	0	0	0	0
185. YOLDIA SCISSURATA	0	0	0	26	4	0	0	0	0	0	0	0	0
186. MYTILIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
187. MEGACRENELLA COLUMBIANA	0	0	0	0	0	0	0	0	0	0	0	0	0
188. MUSCULUS SP. JUV.	0	0	0	0	0	0	0	0	0	0	0	0	0
189. MUSCULUS NIGER	0	1	0	0	0	0	0	0	0	0	0	0	0
190. MUSCULUS CF. DISCORS	0	0	0	0	0	0	0	0	0	0	0	0	0
191. MODIOLUS SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
192. LIMA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
193. LIMATULA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
194. LIMATULA SUBAURICULATA	0	0	0	0	0	0	0	0	0	0	0	0	0
195. LIMATULA CF. ATTENUATA	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES													
MONTH	10	10	10	10	10	10	10	10	10	10	10	10	10
TRANSECT	03	04	04	04	04	06	06	0	06	0	07	11	11
DEPTH	60	30	30	60	60	30	30	6	60	3	30	60	60
REPLICATE	2	1	2	1	2	1	2	1	2	1	2	1	2
	--	--	--	--	--	--	--	--	--	--	--	--	--
SPECIES													
196. AXINOPSIDA SERRICATA	0	0	0	44	28	0	0	0	0	0	0	0	0
197. DIPLODONTA CF. IMPO	0	0	0	0	0	0	0	0	0	0	0	0	0
198. CYCLOCARDIA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
199. MYSELLA CF. TUMIDA	0	0	0	0	0	0	0	0	0	0	0	0	0
200. CYCLOCARDIA CREBRICOSTATA	3	3	0	5	0	0	0	0	0	0	0	0	1
201. CYCLOCARDIA INCISA	0	0	0	0	0	0	0	0	0	0	0	0	0
202. ASTARTE SP., JUV.	0	0	0	0	1	0	0	0	0	0	0	0	0
203. ASTARTE ROLLANDI	0	0	0	0	0	0	0	0	0	0	0	0	0
204. ASTARTE CF. VERNICOSA	0	0	0	0	0	0	0	0	0	0	0	0	0
205. CLINOCARDIUM SP., JUV.	0	1	0	2	0	0	0	0	0	0	0	0	0
206. SERRIPES GROENLANDICUS	0	0	0	0	0	0	0	0		0	0	0	0
207. SPISULA SP.	0	0	0	0	0	0	0	0	0	0	0		0
208. MACTRA ALASKANA		0	0	0	0	0		1	-	0	0	0	0
209. MACTRA NASUATA	0	0	0	0	0	0	0	0	4	0	0	1	0
210. SILIQUA PATULA	0	0	2	0	0	0	0	0	0	0	0	0	0
211. MACOMA SP.	0	0	0	1	4	0	0	0	0	0	0	0	0
212. MACOMA MOESTA	0	0	0	6	8	0	0	1	0	0	0	0	0
213. MACOMA MOESTA ALASKANA	0	0	0	0	0	0	0	0	0	0	0	0	0
214. MACOMA CRASSULA	0	0	0	0	0	0	0	0	0	0	0	0	0
215. MACOMA LAMA	0	0	0	0	0	0	0	0	0	0	0	0	0
216. MACOMA BALTHICA	0	0	0	0	0	0	0	0	0		0	0	0
217. MACOMA CF. BALTHICA	0	0	0	0	0	0	0	0	0	0	0	0	0
218. MACOMA CF. CALCAREA	0	0	0	0	0	0	0	0	0	0	0	0	0
219. MACOMA SP. A	0	0	0	3	0	0	0	0	0	0	0	0	
220. TELLINA SP.		0	0	0		0	0	0	0	0		0	1
221. TELLINA NUCULOIDES	0	11	%	0	0			0	0	0	0	0	0
222. SAXIDOMUS GIGANTEA	0	0	-	0	0		0	0	0	0	0	0	0
223. PSEPHIDIA LORDI	0	0	0	0	0	0	0	0	0	0	0	0	0
224. HUMILARIA KENNERLYI	0	0	0	0	0	0	0	0	0	0	0	0	0
225. PATINOPECTEN CAUIRUS	0	0	0	0	0	0	0	0	0	0	0	0	0
226. MYA SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
227. HIATELLA ARCTICA	0	0	0	0	0	0	0	0	0	0	3	0	0
228. LYONSIA CALIFORNICA	0	0	0	0	0	0	0	0			0	0	0
229. THRACIA SP. ,	0	0	0	0	0	0	0	0	0	0	0	0	0
230. DECAPODA	0	0	0	0	0	0	0	0	0	0	0	0	2
231. CARIDEA		0	0	-	0	0	0	0	0	0	0	0	3
232. PAGURIDAE		0	0	0	0	0	0	0	0	0		0	0
233. MAJIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
234. OROGONIA GRACILIS	0	0	0	0	0	0	0	0	0	0	0	0	0
235. CHIONIECETES SP.	0	0	1	0	0	0	0	0	0	0	0	0	0
236. CANCRIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0
237. PINNOTHERIDAE	0	0	0	0	0	0	0	0	0	0	0	2	2
238. SIPUNCULA	0	0	0	0	1	0	0	0	0	0	0	0	0
239. ALCYONIDIUM SP.	0	0	0	0	0	0	0	0	0	0	0	0	0
240. ASTERIAS AMURENSIS	0	0	0	0	0	0	0	0	0	0	0	0	1
241. OPHIUROIDEA	0	3	1	24	0	0	1	2	4	0	3	1	2
242. STRONGYLOCENTROTUS DROEBACHIENSIS	.	0	0	0	0	0	0	0	0	0	0	0	0
243. DENDRASTER EXCENTRICUS		29	30	0	6	0	0	23	6	1	0	4	15
244. SPATANGIDAE	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX D

(continued)

SAMPLES

SPECIES													
MONTH	1OF-JO	10	10	10	10	10	10	10	10	10	10	10	10
TRANSECT	0	04	04	04	04	06	06	06	06	07	07	11	11
DEPTH	6	30	30	60	60	30	30	60	60	30	30	60	60
REPLICATE	2	1	2	1	2	1	2	1	2	1	2	1	2
245. DENDROCHIROTIDA	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
246. HOLOTHUROIDEA DENDROCHIROTACEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
247. HAVELOCKIA SP. B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
248. THYONINAE A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
249. EUPENTACTA QUINQUESEMITA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
250. PENTAMERA SP.	0.00	0.00	0.00	1.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
251. PENTAMERA LISSOPLACA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
252. PENTAMERA SP. B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
253. CHIRIDOTIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
254. CHIRIDOTA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
255. MYRIOTRHOCHIDAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
256. HEMICHORDATA	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00
257. UROCHORDATA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0. 0	0.
258. DISTAPLIA SP.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
259. AGNESIA SEPTENTRIONALIS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
260. STYELA ?CORIACEA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
261. HALOCYNTHIA AURANTIUM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
262. AMMODYTES HEXAPTERUS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
263. NSPECIES	20.0	32.0	33.0	52.0	37.0	[illegible].00	9.0	34.0	30.0	41.0	[illegible]4.0	23.0	43.0
264. H	2.16	1.[illegible]8	2.[illegible]0	3.12	2.69	[illegible].31	1.91	.375	.578	.656	[illegible].15	1.79	1.76
265. EVENNESS	.722	.571	.6[illegible]2	.789	.745	[illegible].73	.871	.106	0.17	.274	[illegible].816	.571	.468
266. TOTAB	73.0	662.	43[illegible].	640.	424.	[illegible]5.0	30.0	2331	1645	138.	[illegible]7.0	126.	475.

APPENDIX E

RAW DATA FROM EPIFAUNAL SAMPLES

SAMPLES

MONTH	()()	06	()6	06	06	06	06	06	06	04	06	06	06
TRANSECT	()1.	01	01	02	02	().$	03	03	04	04	06	06	06
DEPTH	15	30	50	30	50	2()	30	50	20	50	10	1.5	30
REPLICATE	01	01	01	01	01.	01	01	01	01	01	01	01	03
SPECIES													
1. CHLOROPHYTA	0,000	0$000	0*000	0.000	0	0.007	0.008	o	0	0.000	0	0	0.000
2. PHAEOPHYTA	.0492	.0513	. 3983	,0074	0	2.723	0.313	0	0	0.000	0	0	0.000
3. RHODOPHYTA	0.000	0.000	0*000	.0032	0	0.133	0.046	0	0	0.000	0	0	0.000
4. ZOSTERA MARINA	0.000	0.000	0.000	0.000	0	0.000	0*000	0	0	0.000	0	0	0. 000
5. PORIFERA	0.000	0.000	0.000	0.394	0	0.000	0.000	0	0	0.270	0	0	0.000
6. HYDROIDA	0.000	0.000	0.000	•0025	0	0.000	0,000	0	0	0.000	0	0	0,000
7. ZOOANTHARIA ACTINIARIA	0. 000	0.000	0,000	0.000	0	0.000	0.000	0	0	3.631	0	0	0,000
8. ANEMONE SP. 16	0.000	0.000	0.000	.0961	0	0.000	0.000	0	0	,0194	0	0	0.,000
9. ZOANTHARIA ACTINIARIA NYNANTHEAE	0.000	0.000	0.000	0*000	0	0.000	0.000	0	0	0.000	0	0	0.000
10. METRIDIUM SENILE	0.000	0,000	0.000	0.000	0	0.000	0.000	0	0	0.000	0	0	0.000
11. POLYCHAETA	0.000	0.000	0.000	0.000	0	0.000	0*000	0	0	0.000	0	0	0.000
12. POTAMILLA RENIFORMIS	0. 000	0*000	0.000	0.654	0	0.000	0.000	0	0	0,000	0	0	0.000
13. GASTROPODA	0.000	0.000	0.000	00019	0	0.000	0,000	0	0	0,000	0	0	0.000
14. MARGARITES PUPILLUS	0.000	0.000	0.000	0.000	0	0.000	0*000	0	0	0.000	0	0	0.000
15. TRICHOTROPIS INSIGNIS	0*000	0*000	0,000	0,000	0	0.000	0.000	0	0	0.000	0	0	0.000
16. TRICHOTROPIS CANCELLATA	0.000	0.000	0.000	,0028	0	().000	0,000	0	0	0.000	0	0	0.000
17. VELUTINA LAEVIGATA	0.000	0.000	0.000	,0004	0	0.000	0.000	0	0	0.000	0	0	0.000
18. NATICA CLAUSA	0.000	00013	●0104	,0004	0	0.000	0,000	0	0	0.000	0	0	0.000
19. POLINICES PALLIDA	0.000	0.000	0,000	0.000	0	0.000	0*000	0	0	0.000	0	0	0,000
20. FUSITRITON OREGONENSIS	0.000	00000	0.000	0.000	0	0.000	0.000	0	0	0.000	0	0	0.000
21. NUCELLA SP.	0 * 000	0.000	0.000	0.038	0	0.000	0*000	0	0	0.000	0	0	0.000
22. BERINGIUS BERINGI	0.000	0.000	0.000	0.000	0	0.000	0.000	0	0	0.000	0	0	0.000
23. LIOMESUS NUX	0.000	0.000	0.000	.0039	0	0.000	0.000	0	0	0.000	0	0	0.000
24. NEPTUNEA LYRATA	0.000	0.000	.0459	0.000	0	0.000	0,000	0	0	0.000	0	0	0,000
25. NUDIBRANCHIA	0.000	0*000	0,000	.0037	0	0.000	0.000	0	0	0.000	0	0	0.000
26. MOPALIA HINDSI	0.000	0.000	0.000	,0086	0	0.000	0.000	0	0	0.000	0	0	0.000
27. BIVALVIA	0,000	0,000	0.000	0.000	0	0.000	0.000	0	0	0.000	0	0	0.000
28. MYTILUS EDULIS	0,000	0.000	0.000	0.000	0	0.000	0,000	0	0	0.000	0	0	0,000
29. PODODESMUS SP.	0.000	0.000	0,000	.0192	0	0.000	0.000	0	0	0.000	0	0	0,000
30, CYCLOCARDIA SP.	0 * 000	0.000	0.000	0.000	0	0.000	0.000	0	0	0.000	0	0	0. 000
31. ASTARTE SP. JUV,	0.000	0.000	06000	0.000	0	0,000	0,000	0	0	0.000	0	0	0.000
32. SERRIPES GROENLANDICUS	0.000	0.000	0,000	.0148	0	0,000	0.000	0	0	0.000	0	0	0.000
33. SPISULA SP.	0.000	0*000	0,000	0.000	0	0.000	0.000	0	0	0.000	0	0	0.000
34. SILIQUA PATULA	0.000	0.000	0.000	0.000	0	0,000	0.000	0	0	0.000	0	0	0.000
35. MACOMA SP.	0,000	04000	0.000	0,000	0	0.000	0.000	0	0	0.000	0	0	0.000
36, TELLINA LUTEA	0.000	0.000	0*000	0.000	0	0.000	0.000	0	0	0.000	0	0	0.000
37* TELLINA NUCULOIDES	0,000	0.000	0.000	0.000	0	0.000	0*000	0	0	0.000	0	0	0.000
38. HIATELLA ARCTICA	0.000	0.000	0.000	,0018	0	0.000	0,000	0	0	0.000	0	0	0. 000
.39. CIRRIPEDIA	0.000	0. 000	0.000	15*O3	0	0.000	0.000	0	0	0.220	0	0	2.383
40. DECAPODA	0.000	0.000	0,000	.0002	0	0.000	0.000	0	0	0.000	0	0	0,000
41. HIPPOLYTIDAE	0.022	0*070	.0657	,0107	0	0.004	0. 000	0	0	.0124	0	0	(),()00
42. PAGURIDAE	0.008	0.003	0.000	0.724	0	0,000	0.000	0	0	0.006	0	0	0.000
43, PARALITHODES CAMTSCHATICA	0.000	0,000	0.000	0.000	0	0.000	0.000	0	0	0.000	0	0	0,000
44* MAJIDAE	0.000	0.000	0.000	0.000	0	0. 000	0.000	0	0	0.000	0	0	0.000
45. OROGONIA GRACILIS	0.000	0.000	0.000	,0396	0	0.000	().000	0	0	0,000	0	0	0.000
46. HYAS LYRATUS	0.000	0.000	0.000	0.000	0	0.000	0.000	0	0	0.000	0	0	0.000
47. CHIONIECETES SP',	0.000	0,000	0.000	0.000	0	0.000	0.000	0	0	0.000	0	0	0.000
48. CHIONOECETES OPILIO	0.000	0.000	2.678	0*000	0	0, 000	0. 000	0	0	0.000	0	0	0.000

(continued

SPECIES	MONTH 06 / TRANSECT 01 / DEPTH 15 / REPLICATE 01	06 / 01 / 30 / 01	06 / 01 / 50 / 01	06 / 02 / 30 / 01	06 / 02 / 50 / 01	06 / 03 / 20 / 01	06 / 03 / 30 / 01	06 / 03 / 50 / 01	06 / 04 / 20 / 01	06 / 04 / 50 / 01	06 / 06 / 10 / 01	06 / 06 / 15 / 01	06 / 06 / 30 / 03
49. CHIONOECETES BAIRDI	0.000	2.632	0.000	.0064	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
50. PUGETTIA GRACILIS	0.000	0.000	0.000	.0062	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
51. TELMESSUS CHEIRAGONUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
52. CANCER MAGISTER	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
53. CANCER OREGONENSIS	0.000	0.000	0.001	.2481	0.000	0.000	0.000	0.000	0	.063	0.000	0.000	0
54. ECTOPROCTA	0.000	0.000	0.000	.0252	0.000	0.000	0.001	0.000	0	0.000	0.000	0.000	0
55. ASTEROIDEA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
56. SOLASTER SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
57. PTERASTER SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
58. HENRICIA LEVIUSCULA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.010	0.000	0.000	0
59. ASTERIAS AMURENSIS	0.000	0.000	0.000	.4539	0.000	0.000	16.57	0.800	0	.029	0.000	0.000	0
60. STYLASTERIAS SP.	0.0	0.000	0.0	0.000	0.	0.000	0.000	0.0	0	0.0 0	0.0	0.	
61. OPHIUROIDEA	0.000	0.000	0.000	.0012	0.000	0.000	0.000	0.000	0	2.723	0.000	0.000	0
62. STRONGYLOCENTROTUS DROEBACHIENSIS	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	.026	0.000	0.000	0
63. DENDRASTER EXCENTRICUS	0.071	.12	.02	.001	1.016	0.000	0.000	0.000	0	0.000	0.000	0.000	0
64. HOLOTHUROIDA	0.000	0.000	0.000	3.0665	0.000	0.000	0.000	0.000	0	.138	0.000	0.000	0
65. ASCIDIACEA, COMPOUND	0.000	0.000	0.000	0.190	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
66. ASCIDIACEA, SOLITARY	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
67. DENDRODOA AGGREGATA	0.000	0.000	0.000	.003	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
68. BOLTENIA OVIFERA	0.000	0.000	0.000	0.1101	0.000	0.085	0.000	0.000	0	.491	0.000	0.000	0
69. HALOCYNTHIA AURANTIUM	0.000	0.000	0.000	2.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
70. RAJA ABYSSICOLA	0.000	0.000	0.000	2.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
71. RAJA BINOCULATA	0.000	0.000	0.000	0.633	0.000	0.000	0.0	0.0	0	0.000	0.000	.00	0
72. OSTEICHTHYES	0.00	0.000	0.0	0.000	6.008	0.000	0.000	0.00	0	0.000	0.0	0.00	0
73. CLUPEIDAE	0.00	0.0	0.00	0.00	0.00	0.0	0.00	0.000		0.000	0.00	.9078	
74. CLUPEA HARENGUS PALLASI	0.000	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0	0.000	0.000	0.0 0	0
75. OSMERUS MORDAX	0.000	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0	0.000	0.000	0.000	0
76. ALLOSMERUS ELONGATUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
77. GADIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
78. GADIDAE, JUV.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
79. GADUS MACROCEPHALUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.06	0	0.000	0.000	0.000	0
80. MICROGADUS PROXIMUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.200	0	.2020	0.000	0.000	0
81. THERAGRA CHALCOGRAMMA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	.0723	0.000	0.000	0
82. ZOARCIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	.908	0.000	0.000	0
83. COLOLABIS SAIRA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
84. GASTEROSTEUS ACULEATUS	0.000	0.0	0.	0.00	0.000	0.	0	0.00		0.000	0	0.000	0
85. HEXAGRAMMIDAE	0.0 0	0.0	0.000	0.000	0.000	0.	0.000	0.000		0.0	0.000	0.000	
86. HEXAGRAMMOS LAGOCEPHALUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0	0.000	0.000	0.000	0
87. HEXAGRAMMOS OCTOGRAMMUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
88. HEXAGRAMMOS STELLERI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
89. ANOPLOPOMA FIMBRIA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
90. COTTIDAE	0.000	0.000	0.012	4.811	0.000	0.000	.674	0.000	0	0.5*	.9078	0.000	0
91. AGONIDAE	0.000	0.000	0.050	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
92. LIPARIS SP.	0.000	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
93. TRICHODON TRICHODON	0.000	0.000	0.000	0.000	0.000	0.0	0.000	0.000	0	0.000	0.000	0.000	0
94. ANOPLARCHUS SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
95. LUMPENUS SAGITTA	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0
96. PHOLIS LAETA	.00	0.00	0.000	0.000	0.	0.000	0.000	0.000		0.0	0.000	0.000	0
97. AMMODYTES HEXAPTERUS	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0	0.27	0.000	0.000	0

APPENDIX E

(continued)

SAMPLES

SPECIES													
MONTH	06	06	06	06	0's	06	06	06	06	06	06	06	06
TRANSECT	01	01	01	0?	o?	03	03	03	04	04	06	06	06
DEPTH	15	30	50	30	50	20	30	50	20	50	10	15	30
REPLICATE	01	01	01.	01	01	01	01	01	01	01	01	01	03
98. PLEURONECTIDAE	0.000	0.000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	.2723	0.000	0.000	0.000
99. PLEURONECTIDAE JUV.	0.000	.0048	0,000	0*000	0.000	0.000	0*000	0.000	,090B	0,000	2.269	2.269	0.000
100. ATHERESTHES STOMIAS	0*000	0.000	0.000	0.000	0.000	0.000	0*000	00000	0.000	0.000	0.000	0.000	0,000
101. EOPSETTA JORDANI	0,000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0,000	0,000	0.000	0.000	0,000
102. HIPPOGLOSSOIDES ELASSODON	0.000	0,000	0,000	0.000	.4539	0.000	3.177	1.725	0.000	0.000	0,000	0.000	0,000
103. ISOPSETTA ISOLEPIS	0.000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0*000	0.000	0.000
104. LEPIDOPSETTA BILINEATA	4.857	11,80	2.950	4.766	13.39	.1816	17.48	3*177	4.539	9.305	0.000	0.000	7.262
105. LIMANDA ASPERA	3.631	1.135	3.586	0.336	3.177	22.01	28.14	43*O3	10.21	14,98	0,000	0,000	1.929
106. LIMANDA PROBOSCIDEA	0.000	0*000	0.000	0*000	0.000	0.000	.1135	,3631	.4539	0*000	0.000	0.000	0,000
107. PLATICHTHYS STELLATUS	0.000	0.000	0+000	0,000	0.000	0.000	0.000	0.000	.5901	0.000	0*000	0,000	0.000
108. PLEURONECTES QUADRITUBERCULATUS	.4539	0,000	0.000	0,000	0.000	0.000	.7262	0.000	.5674	0.000	0.000	0.000	.1362
109. HIPPOGLOSSUS STENOLEPIS	0.000	0,000	.1816	0.000	0.000	().000	.1816	0,000	0,000	0.000	0.000	0.000	0.000
110. TOTAL ALGAE	,0492	.0513	, 3?83	.01?6	0.000	2.856	0.359	0*000	0.000	0.000	0*000	0.000	0,000
111. TOTAL INVERTEBRATES	1.301	2.839	2.831	17.97	1.816	0.089	16.57	0.817	0.000	7.170	o*000	0.000	2.383
112. TOTAL FISH	8.942	12*94	6.730	12.55	23.83	22.20	50.38	50.56	16.45	25.25	3.177	3.177	9.328
113. TOTAL FLATFISH	8.942	12,94	6.718	5.102	17,02	22.20	49.82	48,29	16.45	24.28	2.269	2.269	9.328
114, TOTAL BIOMASS	10,29	15.83	9*959	33.71	25.65	25.15	67.32	51.38	16.45	32.42	3,177	3.177	11.71
115. NO. SPECIES	7,000	9,000	13.00	37.00	5.000	7.000	12*OO	6.000	6.000	19.00	2.000	2.000	4.000
116. DIVERSITY (H)	1.162	,7959	1.376	1.792	1.209	.4435	1.351	.6732	1.014	1.453	.5983	.5983	,9692
117. EVENNESS	.5972	,3622	, 5366	.4934	.7512	.2279	,3436	.3757	,5662	,4935	.8631	.8631	.6991
118. TOTAL ABUNDANCE	10.29	15.83	9.959	33.71	25.65	25.15	67.32	51.38	16.45	32.42	3.177	3.177	11.71

APPENDIX E

[continued]

	SAMPLES												
MONTH	04	0A	06	()6	08	08	08	08	08	08	08	08	08
TRANSECT	()7	08	09	()9	A4	A4	A4	A4	01	01	01	01	02
DEPTH	10	50	30	65	20	30	50	60	20	30	50	60	20
REPLICATE	01	01	01	01	01	01	01	01	01	01	01	01	01
SPECIES													
1. CHLOROPHYTA	0	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2. PHAEOPHYTA	0	0.000	0,000	0.000	0.022	0.000	0.000	0.072	0.275	0.000	0.000	0.000	0.000
3. RHODOPHYTA	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0*000	0.000	0.000
4. ZOSTERA MARINA	0	0.000	0.000	0.000	,1745	.4754	0.000	0.138	0.000	0.000	0.000	0.000	0.000
5. PORIFERA	0	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.400
6. HYDROIDA	0	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000
7. ZOOANTHARIA ACTINIARIA	()	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.71
8. ANEMONE SP. 16	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000
9. ZOANTHARIA ACTINIARIA NYNANTHEAE	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
10. METRIDIUM SENILE	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1.1. POLYCHAETA	0	0.000	0*000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12. POTAMILLA RENIFORMIS	0	0,000	0.000	0.000	0.001	.0185	0.000	0*000	0.000	0.000	0.000	0.000	158.6
13. GASTROPODA	0	0.000	0.000	0.000	0.000	0,000	0.000	o*000	0.000	0,000	0.000	0.000	0, 036
14. MARGARITES PUPILLUS	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15. TRICHOTROPIS INSIGNIS	0	0*000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0,000	0.000	0.000	0.000
16. TRICHOTROPIS CANCELLATA	0	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0*000	0.000	o* 000	0.000	0.000
17, VELUTINA LAEVIGATA	0	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0,000	0.000
18.NATICA CLAUSA	0	0.000	00000	0.000	0.000	.0078	0.017	0.003	0.010	0,010	0,006	0.002	0.000
19.POLINICES FALLIDA	0	0,000	0.000	0.000	0.000	0.000	0.000	0. 000	0. 000	0,000	0.000	0,000	0.000
20. FUSITRITON OREGONENSIS	0	0*000	0.000	0,000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000
21.NUCELLA SP',	0	0*000	0. 000	0.000	0.000	0.000	0. 000	0.000	0.000	0.000	0,000	0,000	0.000
22.BERINGIUS BERINGI	0	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23. LIOMESUS NUX	0	0*000	0.000	0.000	0.000	0.000	0. 000	0.000	0.000	0.000	0.000	0,000	0.000
24. NEPTUNEA LYRATA	0	0.000	0.000	0.000	0.000	0.000	0.000	0*000	0*000	0.000	0.000	0. 187	0.000
25. NUDIBRANCHIA	0	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0.000	0.000	0.000
26. MOPALIA HINDSI	0	0.000	0.000	0.000	0.000	0. 000	0.000	0.000	0. 000	0.000	0.000	0.000	0.000
27. BIVALVIA	0	0,000	0.000	0.081	o. 000	0.000	0.000	0.000	0,000	0,000	0. 000	0.001	0.000
28. MYTILUS EDULIS	0	0,000	0. 000	04000	0.000	0*000	0.000	0.000	0.000	0*000	0. 000	0.000	0.000
29. PODODESMUS SP.	0	0,000	0.000	0.000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0,000	0.000
30.CYCLOCARDIA SP',	0	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000
31. ASTARTE SP. JUV.	()	0,000	0,000	0.000	0.000	0.000	0*000	0.000	04000	0.000	0.000	0,000	0.004
32. SERRIPES GROENLANDICUS	o	0*000	0.041	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000
33. SPISULA SP'.	0	0,000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
34. SILIQUA PATULA	0	0.000	0.028	0.028	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0*000
35. MACOMA SP.	0	0,000	0*000	0.000	0.000	0.000	0. 000	0.000	0. 000	0.000	0.000	0*000	0.012
36.TELLINA LUTEA	0	0,000	0.000	0.000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000
37. TELLINA NUCULOIDES	0	0.000	0*040	0.000	0.000	0*000	0.000	0*000	00000	0.000	0,000	0.000	0.000
38.HIATELLA ARCTICA	0	0.000	0*000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0,000	0,000	0*000
39. CIRRIPEDIA	0	0,000	0.000	0*000	0.000	0.000	0.000	0.000	0,000	0,000	0.000	04000	0.000
40. DECAPODA	0	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0. 000	0.000	0.000	0,000	0.180
41. HIPPOLYTIDAE	0	0.000	0.032	0.032	0.059	,0925	0.041	0.028	0.084	0,000	0.063	0.087	0.028
42. PAGURIDAE	0	,1784	0.028	0.028	0.000	.0353	0.007	0.118	0.000	0.000	0.000	0. 008	1.600
43. PARALITHODES CAMTSCHATICA	0	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0*000	0.000	0.000
44. MAJIDAE	0	0.000	0.000	0.000	0.000	0.000	0.000	0. 000	0.000	0.000	().000	0,000	0.180
45. OROGONIA GRACILIS	0	.0384	0. 000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	o. 000	0.000	0,000
46. HYAS LYRATUS	0	(),000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	04000	0.000
47.CHIONIECETES SP'.	()	0.000	0.000	0.000	0.000	0.000	0*000	0. 000	0.000	0.000	0.000	0.000	0.000
48. CHIONOECETES OPILIO	()	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.006	o. 000	o. 000	0.000

APPENDIX E

(continued)

SAMPLES

SPECIES													
MONTH	06	06	06	06	08	08	08	08	08	08	08	08	08
TRANSECT	07	08	09	09	A4	A4	A4	A4	01	01	01	01	02
DEPTH	10	50	30	65	20	30	50	60	20	30	50	60	20
REPLICATE	01	01	01	01	01	01	01	01	01	01	01	01	01
49. CHIONOECETES BAIRDI	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000
50. PUGETTIA GRACILIS	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51. TELMESSUS CHEIRAGONUS	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52. CANCER MAGISTER	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
53. CANCER OREGONENSIS	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.400
54. ECTOPROCTA	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
55. ASTEROIDEA	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56. SOLASTER SP.	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
57. PTERASTER SP.	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58. HENRICIA LEVIUSCULA	0.00	0.000	0.04[illegible]	0.0[illegible]4	0.0	0.[illegible]71	0.000	0.000	0.000	0.000	0.000	0.000	0.000
59. ASTERIAS AMURENSIS	23.15	52.57	55.[illegible]	56.[illegible]	3.631	3.[illegible]4	.5674	0.070	0.000	0.000	0.000	0.007	0.000
60. STYLASTERIAS SP.	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004
61. OPHIUROIDEA	.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62. STRONGYLOCENTROTUS DROEBACHIENSIS	.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
63. DENDRASTER EXCENTRICUS	.00	0.000	0.000	0.000	.1705	0.000	0.000	0.000	0.000	0.000	0.014	0.008	0.000
64. HOLOTHUROIDA	.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.506
65. ASCIDIACEA, COMPOUND	.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.370
66. ASCIDIACEA, SOLITARY	.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
67. DENDRODOA AGGREGATA	.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
68. BOLTENIA OVIFERA	3.00	0.000	0.026	.387	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.000	70.80
69. HALOCYNTHIA AURANTIUM	.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70. RAJA ABYSSICOLA	.00	3.041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
71. RAJA BINOCULATA	.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
72. OSTEICHTHYES	.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000
73. CLUPEIDAE	0	0.000	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000
74. CLUPEA HARENGUS PALLASI	0.0	0.000	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000
75. OSMERUS MORDAX	0.0	0.000	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000
76. ALLOSMERUS ELONGATUS	0.0	0.000	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000
77. GADIDAE	0.0	0.000	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000
78. GADIDAE, JUV.	0.0	0.000	0.000	1.475	1.000	1.242	0.19	0.008	0.045	0.023	0.006	0.005	0.001
79. GADUS MACROCEPHALUS	0.0	.4539	8.57	1.110	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.630
80. MICROGADUS PROXIMUS	0.0	0.000	0.000	0.054	0.000	3.631	0.000	0.000	0.000	0.000	0.000	0.000	0.000
81. THERAGRA CHALCOGRAMMA	0.0	1.135	0.054	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
82. ZOARCIDAE	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
83. COLOLABIS SAIRA	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
84. GASTEROSTEUS ACULEATUS	0	0.000	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.00	0	0.000
85. HEXAGRAMMIDAE	0.0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
86. HEXAGRAMMOS LAGOCEPHALUS	0.0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
87. HEXAGRAMMOS OCTOGRAMMUS	0.0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
88. HEXAGRAMMOS STELLERI	0.0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
89. ANOPLOPOMA FIMBRIA	0.0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.450	0.000	0.000
90. COTTIDAE	0.0	0.00	2.837	2.837	.15	2.793	1.362	0.025	0.000	0.000	0.008	0.088	0.000
91. AGONIDAE	0.0	0.10	0.124	0.124	0.00	0.07	0.000	0.000	0.000	0.000	0.000	0.001	0.000
92. LIPARIS SP.	0.0	0.00	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.001	0.000	0.000
93. TRICHODON TRICHODON	0.0	0.00	0.000	0.000	0.00	0.00	0.000	0.000	0.042	0.006	0.000	0.000	0.000
94. ANOPLARCHUS SP.	0.0	0.00	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.004
95. LUMPENUS SAGITTA	0.0	0.00	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
96. PHOLIS LAETA	0.0	0.00	0.000	0.000	0.00	0.00	0.000	00	0.00	0.000	0.000	0.00	0.000
97. AMMODYTES HEXAPTERUS	0.00	0.00	0.000	0.000	.151	0.051	0.00	0.000	0.009	0.000	0.002	0.000	0.000

APPENDIX E

(continued)

	SAMPLES												
MONTH	06	06	06	06	08	08	08	08	08	08	08	08	08
TRANSECT	07	08	09	09	A4	A4	A4	A4	01	01	01	01	02
DEPTH	10	50	30	65	20	30	50	60	20	30	50	60	20
REPLICATE	01	01	01	01	01	01	01	01	01	01	01	01	01
SPECIES													
98. PLEURONECTIDAE	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
99. PLEURONECTIDAE JUV.	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.020	0.006	0.000	0.000
100. ATHERESTHES STOMIAS	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.027	0.000
101. EOPSETTA JORDANI	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
102. HIPPOGLOSSOIDES ELASSODON	0.00	0.000	1.475	1.[illegible]75	0.000	0.000	0.000	0.170	0.000	0.000	0.000	0.275	0.000
103. ISOPSETTA ISOLEPIS	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.9078	0.100	0.000	0.00
104. LEPIDOPSETTA BILINEATA	0.00	13.62	31.77	31.77	4.[illegible]93	8.[illegible]24	2.723	2.496	4.539	6.808	3.177	3.177	12.71
105. LIMANDA ASPERA	0.00	27.01	29.12	29.50	1[illegible].62	1.[illegible]80	6.[illegible]08	7.716	.3404	3.177	.808	2.723	0.000
106. LIMANDA PROBOSCIDEA	0.00	.2269	1.135	1.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
107. PLATICHTHYS STELLATUS	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
108. PLEURONECTES QUADRITUBERCULATUS	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
109. HIPPOGLOSSUS STENOLEPIS	0.0	.9078	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000
110. TOTAL ALGAE	0.00	0.00	0.000	0.000	0.022	0.000	0.000	0.072	0.275	0.000	0.000	0.000	0.700
111. TOTAL INVERTEBRATES	23.15	52.79	55.79	58.51	4.036	4.317	.6324	0.359	4.094	0.016	0.173	0.305	24.[illegible]0
112. TOTAL FISH	0.00	46.49	74.57	78.48	19.78	28.13	11.08	10.42	4.986	10.94	10.93	7.117	16.34
113. TOTAL FLATFISH	0.00	41.76	63.50	63.89	18.61	20.43	9.532	10.38	5.890	10.91	10.47	6.203	12871
114. TOTAL BIOMASS	23.15	99.28	130.4	137.0	23.84	32.45	11.72	10.85	9.355	10.96	11.11	7.422	26.[illegible]7
115. NO. SPECIES	1.00	11.00	15.00	15.00	11.00	14.00	8.000	12.00	.000	8.000	14.00	15.00	18[illegible]0
116. DIVERSITY (H)	0.00	1.[illegible]24	1.412	1.510	1.197	1.660	1.152	.8546	.6463	.9001	1.041	1.311	1.1[illegible]0
117. EVENNESS	0.00	.5[illegible]06	.5214	.5576	.4993	.6291	.5541	.3439	[illegible]2942	.4328	.3946	.4842	.4[illegible]7
118. TOTAL ABUNDANCE	23.15	99.28	130.4	137.0	23.84	32.45	11.72	10.85	[illegible]355	10.96	11.11	7.422	26[illegible]7

APPENDIX E

(continued)

SAMPLES

SPECIES													
MONTH	()(1	08	08	on	08	08	08	08	08	0?3	08	08	08
TRANSECT	0:)	02	():<	03	04	()4	04	06	06	06	06	07	07
DEPTH	60	60	3()	6()	60	.s0	60	20	30	50	60	10	30
REPLICATE	()1	02	01	01	01	o:!	03	01	01	01	01	01	01
1. CHLOROPHYTA	0.000	0,000	0.000	0,000	0.000	0.000	0.000	O*OOO	0.000	0,000	0.000	0*000	O*OOO
2, PHAEOPHYTA	0,000	0.000	0.023	0.000	0.050	0.035	0.245	* 006?	0.000	0.000	0.000	0.000	0.000
3. RHODOPHYTA	0,000	0,000	0*000	0.270	0.000	0.000	o.000	0.000	0.000	0.000	0.000	0.000	0.000
4. ZOSTERA MARINA	0.000	0.000	0,000	0.000	0.000	0.000	0.000	.0503	0.000	0.000	0.000	0*000	0.000
5. PORIFERA	0,000	0.000	0,000	0.195	0.000	0.170	0.200	0*000	3.631	0.000	0,000	0.000	.3163
6. HYDROIDA	0.000	0,000	0,000	0.000	0.000	0.000	0.000	o* 000	0,000	0,000	0.000	0.000	0.000
7* ZOOANTHARIA ACTINIARIA	0*000	0,000	0*000	04000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8. ANEMONE SP. 16	0.038	0.400	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9. ZOANTHARIA ACTINIARIA NYNANTHEAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000
10. METRIDIUM SENILE	0.000	0.000	0,000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11* POLYCHAETA	0.000	0.000	00000	00000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12. POTAMILLA RENIFORMIS	0.002	0.079	0.110	0.000	0.000	0.000	0.000	0*000	4.085	0.000	0.000	0.000	0.000
13. GASTROPODA	0.000	0.000	0.000	0,000	0.000	0*000	0,000	0*000	0.000	0.000	0.000	0.000	0.000
14. MARGARITES PUPILLUS	0.000	0.000	0.000	0.000	0.000	0*000	0,000	0.000	0.020	0.000	0.000	0,000	0.000
15. TRICHOTROPIS INSIGNIS	0.000	0,000	0.000	00000	0,000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	.0006
16, TRICHOTROPIS CANCELLATA	0.000	0.000	0.000	0.000	0.000	00000	0.000	0.000	.1362	0*000	0.000	0.000	0.000
17* VELUTINA LAEVIGATA	0*000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0,000	.0196
18. NATICA CLAUSA	0,000	0.010	0.000	00000	0.000	0.003	0.000	0.000	.0109	0.000	,0207	0.000	.0169
19. POLINICES PALLIDA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0*000	0.000	0*000	0.000	0.000	0.000
20. FUSITRITON OREGONENSIS	0.000	0*000	0,000	0.000	0.000	0.000	0.000	O* 000	0.000	0,000	0.000	0.000	0.000
21. NUCELLA SP',	0.000	0.000	0.000	0*000	0.000	0.000	0.000	O* 000	0.000	0*000	0.000	0.000	0.000
22. BERINGIUS BERINGI	0*000	0*000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0.000	0.000	0.000	0.000
23. LIOMESUS NUX	0,000	0.000	0.000	0.000	0,000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
24. NEPTUNEA LYRATA	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	04000	0.000	0.000	0.000	0.000
25. NUDIBRANCHIA	0.000	0.000	0,000	0*000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	.0064
26. MOPALIA HINDSI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.0074	0.000	0.000	0,000	0.000
27. BIVALVIA	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28. MYTILUS EDULIS	0.000	0,000	0.000	0*000	0.000	0.000	0.000	0.000	0.408	0.000	0.000	0.000	0,000
29. PODODESMUS SP.	0*000	0*000	0.000	0,000	0.000	0.000	0.000	0.000	6.808	0,000	0*000	0.000	,2269
30. CYCLOCARDIA SP,	0.000	0.000	0.001	0.000	0.000	0.000	0.000	09000	0.000	0.000	0.000	0,000	0.000
31. ASTARTE SP. JUV,	0,000	0,004	0*000	0.000	0.000	0*000	0.000	0.000	0*000	0.000	0*000	0,000	0.000
32. SERRIPES GROENLANDICUS	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
33. SPISULA SP.	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
34. SILIQUA PATULA	0,000	0.000	0.002	0.000	0.000	0.000	0.000	0*000	0*000	0.000	00000	0.000	0.000
35. MACOMA SP',	0.000	0*000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0*000
36. TELLINA LUTEA	0.000	o*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,067	0,000	0.000	0.000
37. TELLINA NUCULOIDES	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000
38. HIATELLA ARCTICA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
39. CIRRIPEDIA	0.000	0,000	0.000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0,000	0.000	3.631
40. DECAPODA	0*000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.172	.9078	0*000	0.000	0.000
41. HIPPOLYTIDAE	0.006	0,000	0.055	0.008	0.042	0.120	0*004	0,263	.0087	,0505	.0507	.4919	.0069
42. PAGURIDAE	0.006	0.008	0.010	0.205	0.460	0.120	0.425	0.000	0.804	, 1484	0.030	,2269	.0643
43. PARALITHODES CAMTSCHATICA	0*000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
44. MAJIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000
45. OROGONIA GRACILIS	04000	0,000	0,000	0*000	0*000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000
46. HYAS LYRATUS	0.000	0.002	0.000	0.000	0.000	0*000	0.000	0,000	.0084	0.000	0,000	.	0.000
47. CHIONIECETES SP.	0*000	0.000	0.000	0.000	0.000	o.000	0.000	0.000	0.000	0*000	0*000	o.000	0*000
48. CH1ONOECETES OPILIO	0.000	0.000	0.000	0.001	0.000	0.000	0*000	0.000	0*000	0.000	0.000	0.000	0.000

APPENDIX E

(continued)

SAMPLES

SPECIES													
MONTH	08	08	08	08	08	08	08	08	08	08	08	08	08
TRANSECT	02	02	03	03	04	04	04	06	06	06	06	07	07
DEPTH	60	60	30	60	60	60	60	20	30	50	60	10	30
REPLICATE	01	02	01	01	01	02	03	01	01	01	01	01	01
49. CHIONOECETES BAIRDI	0.001	0.000	0.000	0.000	0.005	0.004	0.040	0.000	0.000	0.005	0.000	0.000	0.000
50. PUGETTIA GRACILIS	0.000	0.000	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51. TELMESSUS CHEIRAGONUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52. CANCER MAGISTER	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
53. CANCER OREGONENSIS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.0787	0.095	0.000	0.000	.0126
54. ECTOPROCTA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.448	0.000	0.000	0.000	0.000	.000
55. ASTEROIDEA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.4539
56. SOLASTER SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.1064	0.000	0.000	0.000	0.000
57. PTERASTER SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58. HENRICIA LEVIUSCULA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.000
59. ASTERIAS AMURENSIS	0.005	0.003	7.71	0.003	0.000	0.000	0.030	.378	8.624	0.014	3.177	0.000	.262
60. STYLASTERIAS SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
61. OPHIUROIDEA	0.000	0. 08	0.000	0.001	0.000	0.000	0.000	0.000	.0272	0.000	0.000	0.000	.0119
62. STRONGYLOCENTROTUS DROEBACHIENSIS	0.000	0.041	0.000	0.025	0.000	0.000	0.000	0.000	0.060	0.000	0.000	0.000	.0074
63. DENDRASTER EXCENTRICUS	3.177	1.016	0.000	0.015	0.000	0.000	0.000	0.000	0.000	.049	.6467	0.000	.000
64. HOLOTHUROIDA	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	.0079	0.000	0.000	0.000	.000
65. ASCIDIACEA, COMPOUND	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.000
66. ASCIDIACEA, SOLITARY	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.000
67. DENDRODOA AGGREGATA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.000
68. BOLTENIA OVIFERA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	49.93	0.000	3.177	0.000	.362
69. HALOCYNTHIA AURANTIUM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.0175
70. RAJA ABYSSICOLA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.000
71. RAJA BINOCULATA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
72. OSTEICHTHYES	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
73. CLUPEIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
74. CLUPEA HARENGUS PALLASI	0.000	0.000	0.000	0.000	.9078	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
75. OSMERUS MORDAX	.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.300	0.000
76. ALLOSMERUS ELONGATUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.000
77. GADIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.000	2.723	0.000	0.000	0.000	0.000
78. GADIDAE, JUV.	0.005	0.004	0.095	0.000	0.050	0.000	0.004	.0589	.6429	.971	.0086	0.000	0.000
79. GADUS MACROCEPHALUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.000	0.000	0.408	0.000
80. MICROGADUS PROXIMUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.000	0.000	0.000	0.000	2.038	.051
81. THERAGRA CHALCOGRAMMA	0.000	0.000	0.000	0.020	0.000	0.000	0.000	.4539	0.000	0.000	0.000	.000	0.000
82. ZOARCIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
83. COLOLABIS SAIRA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.000	0.000	0.000	0.000	0.000	0.000
84. GASTEROSTEUS ACULEATUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
85. HEXAGRAMMIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.631
86. HEXAGRAMMOS LAGOCEPHALUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
87. HEXAGRAMMOS OCTOGRAMMUS	.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
88. HEXAGRAMMOS STELLERI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
89. ANOPLOPOMA FIMBRIA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90. COTTIDAE	.4539	0.000	0.000	0.000	0.000	0.000	0.000	.4539	.4191	0.000	0.000	0.000	0.000
91. AGONIDAE	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.098	0.000	0.000	0.084	1.589
92. LIPARIS SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	30	.000
93. TRICHODON TRICHODON	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.0011	.0272
94. ANOPLARCHUS SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
95. LUMPENUS SAGITTA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
96. PHOLIS LAETA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
97. AMMODYTES HEXAPTERUS	0.100	0.080	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.0188	0.000

APPENDIX E

(continued)

SAMPLES

SPECIES													
MONTH	08	08	08	08	08	08	08	08	08	08	08	08	08
TRANSECT	02	02	03	03	04	04	04	06	06	06	06	07	07
DEPTH	60	60	30	60	60	60	60	20	30	50	60	10	30
REPLICATE	01	02	01	01	01	02	03	01	01	01	01	01	01
9(3. PLEURONECTIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0 * 000	0.000	0.000	0.000	O*OOO	0,000
99. PLEURONECTIDAE JUV.	0,000	0.000	0.005	0.000	00000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000
100, ATHERESTHES STOMIAS	0.000	0.000	0,000	0.000	0.000	00000	0.100	0.000	0.000	.0397	0.230	06000	0,000
101.EOPSETTA JORDANI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
102. HIPPOGLOSSOIDES ELASSODON	0.000	0.000	0.026	0.005	0.318	0.143	0.275	0.000	0.000	0.000	0,000	0.000	0.000
103. ISOPSETTA ISOLEPIS	0.000	0.000	0.000	0.000	0,000	0.000	00000"	0.000	0.000	0.000	0.000	0,000	0.000
104. LEPIDOPSETTA BILINEATA	0.275	3*177	6.808	3.631	3.136	3.136	3,631	2.269	0.000	6.808	12.26	0.613	3.631
105. LIMANDA ASPERA	3.631	* 453?	12.71	12.71	11.35	9,986	16,79	15.89	0.000	19.97	24.51	7.716	0,000
106. LIMANDA PROBOSCIDEA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	o.000	0.000	0,000
107. PLATICHTHYS STELLATUS	0,000	0.000	0.000	0.000	0.000	0.000	0.000	, ?078	00000	0.000	0.000	0.000	0.000
108. PLEURONECTES QUADRITUBERCULATUS	0.000	0.000	0.000	0.000	,4539	0.000	0.000	2.723	0.000	3.177	0.000	,5016	0,000
109. HIPPOGLOSSUS STENOLEPIS	0,000	0.000	.4539	0.275	0.000	0.000	0.000	0.000	0,000	0 * 000	0.000	0.000	0,000
110. TOTAL ALGAE	0,000	0.000	0.023	0.270	0.050	0*035	0.245	.0069	0.000	0,000	0.000	0.000	0.000
111. TOTAL INVERTEBRATES	3.235	2.375	7.894	0.488	0.308	0.417	0,69?	.8991	74 .?4	1.219	7.111	,7189	13.42
112. TOTAL FISH	4.465	3*715	20.13	16.64	16.21	13.26	20,80	22.75	3.283	30,09	37.00	9.533	8.929
113. TOTAL FLATFISH	3.906	3*631	20.00	16.62	15.26	13.26	20.80	21.79	0.000	30.00	37*OO	8.831	3,631
114. TOTAL BIOMASS	7.700	6.090	28.05	17.40	16.77	13.72	21.75	23.66	78.23	31.31	44.12	10.25	22,35
115.NO. SPECIES	12.00	15.00	15.00	15.00	11.00	9.000	11.00	12.00	24.00	13.00	10.00	10.00	21.00
116.DIVERSITY (H)	1.112	1.268	1.204	,8335	1.060	,7728	,7729	1,203	1 .328	1.040	1.170	1.026	1.870
117. EVENNESS	.4476	.4684	.4446	* 3078	0.442	.3517	.3223	,4843	.4178	.4055	0.508	.4457	.6143
118. TOTAL ABUNDANCE	7.700	6,090	28.05	17.40	16.77	13.72	21.75	23.66	78,23	31.31	44.12	10.25	22.35

APPENDIX E

(continued)

SAMPLES

SPECIES													
MONTH	08	08	08	08	08	08	08	08	08	08	08	08	10
TRANSECT	07	08	08	08	08	09	09	09	09	10	10	10	02
DEPTH	50	10	30	50	60	20	30	50	60	20	30	60	30
REPLICATE	01	01	01	01	01	01	01	01	01	01	01	01	01
1. CHLOROPHYTA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
2. PHAEOPHYTA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
3. RHODOPHYTA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
4. ZOSTERA MARINA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
5. PORIFERA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	.22 9	0.055
6. HYDROIDA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
7. ZOOANTHARIA ACTINIARIA	0.000	0.000	0.53	0.000	0.000	0.000	0.000	0.000	0.000	0	.2209	0.000	0.095
8. ANEMONE SP. 16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
9. ZOANTHARIA ACTINIARIA NYNANTHEAE	.9078	0.000	0.000	.0030	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
10. METRIDIUM SENILE	0.000	0.000	0.000	.0238	0.000	0.000	0.046	0.000	.226	0	0.000	0.000	0.000
11. POLYCHAETA	0.000	0.000	0.000	0.000	0.000	0.000	.220	0.000	0.000	0	0.000	0.000	0.000
12. POTAMILLA RENIFORMIS	0.000	.000	0.000	0.000	0.0	0	0.000	0.000	0.000	0	.000	.000	0.040
13. GASTROPODA	0.000		2.814	0		0		0	.0	0		0.000	0.000
14. MARGARITES PUPILLUS	0.000	0.000	.0297	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.010
15. TRICHOTROPIS INSIGNIS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
16. TRICHOTROPIS CANCELLATA	0.000	0.000	.3039	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.017
17. VELUTINA LAEVIGATA	0.000	0.000	.0481	0.000	0.000	0.000	0.000	.22	0.000	0	0.000	0.0 0	0.000
18. NATICA CLAUSA	0.000	0.000	.0138	0.000	0.000	0.000	0.000	0.000	.22 0	0	0.000	.239	0.000
19. POLINICES PALLIDA	0.000	0.000	.000	0.000	0.000	0.000	0.000	0.000	0.009	0	0.000	0.000	0.000
20. FUSITRITON OREGONENSIS	0.000	0.000	.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
21. NUCELLA SP.	0.000	0.000	.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	.200	0.058
22. BERINGIUS BERINGI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
23. LIOMESUS NUX	0.000	0.000	.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
24. NEPTUNEA LYRATA	0.0 0	0.0 0	.000	0.000	0.0 0	0.000	0.000	0.000	0.000	0	0.000	0.0 0	0.000
25. NUDIBRANCHIA	.0067	0.000	.0	0.000	0.000	.000	0.0 0	0.000	0.000		0.000	0.000	0.0 0
26. MOPALIA HINDSI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
27. BIVALVIA	.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.002
28. MYTILUS EDULIS	0.000	0.000	.223	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.002
29. PODODESMUS SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
30. CYCLOCARDIA SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	.000
31. ASTARTE SP. JUV.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.2269	0.000	0	0.000	0.000	0.000
32. SERRIPES GROENLANDICUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
33. SPISULA SP.	.000	0.000	0.000	.000	.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
34. SILIQUA PATULA	0.000	0.000	0.000	0.000	0.000	0.000	.2269	0.000	0.000	0	0.000	0.000	0.000
35. MACOMA SP.	0.000	0.000	0.000	0.000	0.000	0.000	.000	0.000	0.000	0	0.000	0.000	0.001
36. TELLINA LUTEA	0.000	.000	0.0	0.0	0.	0	0.000	.000		0	0.		0. 0
37. TELLINA NUCULOIDES	0.000	0.	0.000	0.0 0	0.000	0.000	0.000	.0 0	.000	0	0.0 0	.000	0. 00
38. HIATELLA ARCTICA	0.000	0.000	0.000	.000	0.000	0.000	0.000	0.000	.000	0	0.000	0.000	0.000
39. CIRRIPEDIA	.5200	0.000	0.000	.4505	0.000	0.000	0.000	0.000	0.000	0	.2209	0.000	4.330
40. DECAPODA	.0054	0.000	.000	0.000	0.000	0.000	0.000	0.000	0.000	0	.040	0.000	0.00
41. HIPPOLYTIDAE	.0254	2.000	.3898	.0202	.0325	.4549	.2249	.2209	0.000	0	.2209	.2269	0.053
42. PAGURIDAE	.0288	0.000	.2824	0.000	.1389	.000	.22 9	0.000	.226	0	0.000	.2269	1.055
43. PARALITHODES CAMTSCHATICA	0.000	0.000	.000	0.000	0.000	0.000	0.000	0.000	.01	0	0.000	.000	0.000
44. MAJIDAE	0.000	0.000	.000	0.000	.000	0.000	0.000	0.000	0.000	0	0.000	.000	0.000
45. OROGONIA GRACILIS	0.000	0.000	1.362	0.000	.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
46. HYAS LYRATUS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000
47. CHIONIECETES SP.	0.000	0.000	0.000	0.000	0.000	0.000	.000	0.000	0.000	0	0.000	0.000	0.000
48. CHIONOECETES OPILIO	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000

APPENDIX E

(continued)

SAMPLES

SPECIES	08 07 50 01	08 08 10 01	08 08 30 01	08 08 50 01	08 08 60 01	08 09 20 01	08 09 30 01	08 09 50 01	08 09 60 01	08 10 20 01	08 10 30 01	08 10 60 01	10 02 30 01
MONTH	08	08	08	08	08	08	08	08	08	08	08	08	10
TRANSECT	07	08	08	08	08	09	09	09	09	10	10	10	02
DEPTH	50	10	30	50	60	20	30	50	60	20	30	60	30
REPLICATE	01	01	01	01	01	01	01	01	01	01	01	01	01
49. CHIONOECETES BAIRDI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	.226	0.000
50. PUGETTIA GRACILIS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
51. TELMESSUS CHEIRAGONUS	0.000	0.000	0.000	0.000	0.000	0.000	.2269	0.000	0.000	0.000	0.000	0.000	0.000
52. CANCER MAGISTER	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
53. CANCER OREGONENSIS	0.000	0.000	.0417	0.000	0.000	0.000	0.000	0.000	.2269	0.000	0.000	.226	0.040
54. ECTOPROCTA	0.000	0.000	0.049	0.000	0.000	0.000	.0021	0.000	0.000	0.000	0.000	0.000	0.142
55. ASTEROIDEA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56. SOLASTER SP.	0.000	0.000	.0954	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.045
57. PTERASTER SP.	0.000	0.000	.2269	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58. HENRICIA LEVIUSCULA	0.000	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020
59. ASTERIAS AMURENSIS	4.539	1.589	15.89	0.8	.42	.53	7.035	8.17	22.69	3.2	6.355	0.00	3.631
60. STYLASTERIAS SP.	0.000	0.000	.4988	.00	0.000	.00	0.000	0.000	0.000	0.000	0.000	.00	0.00
61. OPHIUROIDEA	0.000	0.00	.0242	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62. STRONGYLOCENTROTUS DROEBACHIENSIS	0.000	0.00	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
63. DENDRASTER EXCENTRICUS	.0066	0.00	0.000	0.000	0.000	0.000	.269	0.000	0.000	0.000	0.000	0.000	0.000
64. HOLOTHUROIDA	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
65. ASCIDIACEA, COMPOUND	.0184	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.095
66. ASCIDIACEA, SOLITARY	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010
67. DENDRODOA AGGREGATA	0.000	0.00	0.000	.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
68. BOLTENIA OVIFERA	3.631	0.00	56.28	.9078	3.031	0.000	.269	0.000	2269	0.000	.22	7.716	0.000
69. HALOCYNTHIA AURANTIUM	0.000	0.00	0.000	0.000	0.000	0.000	0.00	0.000	.000	0.000	.000	0.000	0.000
70. RAJA ABYSSICOLA	0.000	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.000	0.00
71. RAJA BINOCULATA	0.000	0.00	0.00	0.000	0.000	30.4	0.00	0.00	0.000	0.000	0.000	0.000	0.000
72. OSTEICHTHYES	0.000	0	0.0	0.000	0.000	0.000	0.00	0	0.000	0.00	0	0.000	0.000
73. CLUPEIDAE	0	.000	0.00	0.0	0.000	0.000	0.0	0.00	0.00	0.00	0.0	0.0	0.000
74. CLUPEA HARENGUS PALLASI	0.00	.3404	0.00	0.0	0.000	0.000	0.0	0.00	0.00	0.00	0.0	0.0	0.000
75. OSMERUS MORDAX	0.0	.4539	0.00	0.0	0.000	0.000	0.0	0.00	0.00	0.00	0.0	0.0	0.000
76. ALLOSMERUS ELONGATUS	0.0	.000	0.00	0.0	0.000	0.000	0.0	0.00	0.00	0.00	0.0	0.0	0.000
77. GADIDAE	0.0	.000	0.00	0.0	0.000	0.000	0.0	0.00	0.00	0.00	0.0	0.0	0.000
78. GADIDAE, JUV.	0.005	.000	0.00	0.0	0.000	0.005	0.0	0.00	0.00	0.00	0.0	0.0	0.040
79. GADUS MACROCEPHALUS	0.0	.5674	0.00	0.0	0.000	6.359	.249	19.52	.13	.00	0.0	0.0	0.000
80. MICROGADUS PROXIMUS	0.0	.1816	0.00	0.0	0.000	.2260	.229	0.000	0.00	.453	.459	.229	0.000
81. THERAGRA CHALCOGRAMMA	0.0	.5674	0.0	.074	0.00	0.000	0.0	.2269	0.00	.00	.229	0.0	0.005
82. ZOARCIDAE	0.0	.000	0.00	0.0	0.000	0.009	0.0	0.000	0.00	.00	0.0	0.0	0.000
83. COLOLABIS SAIRA	0.0	.000	0.00	0.0	0.000	.2260	0.0	0.000	0.00	.00	0.0	0.0	0.000
84. GASTEROSTEUS ACULEATUS	0	.000	0.00	0.000	0.0	0.000	0.0	0.000	0.00	.00	0.0	0.0	0.000
85. HEXAGRAMMIDAE	0.000	0.000	0.000	0.0	0.000	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.000
86. HEXAGRAMMOS LAGOCEPHALUS	0.000	.248	0.000	0.0	0.000	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.000
87. HEXAGRAMMOS OCTOGRAMMUS	0.000	.269	0.000	0.0	0.000	0.000	0.000	0.000	0.000	0.00	.000	0.00	0.000
88. HEXAGRAMMOS STELLERI	0.000	.000	0.000	0.0	0.000	0.000	.269	0.000	0.000	0.00	.000	0.00	0.000
89. ANOPLOPOMA FIMBRIA	0.000	.2000	0.000	0.0	0.000	.009	0.00	0.000	0.000	0.00	.000	0.00	0.000
90. COTTIDAE	0.007	2.456	0.792	0.0	0.000	.2260	3.17	7.035	1.589	0.00	.2269	0.00	0.16
91. AGONIDAE	.9825	.269	14539	0.0	0.000	0.000	0.00	0.00	0.000	0.00	.2269	0.00	0.00
92. LIPARIS SP.	0.000	0.000	.000	0.0	0.00	0.000	0.00	0.00	.2269	0.00	.000	0.00	0.000
93. TRICHODON TRICHODON	0.000	0.000	0.000	0.0	0.000	0.000	.26	0.00	.000	0.00	.000	0.00	0.000
94. ANOPLARCHUS SP.	0.000	0.000	.000	0.0	0.00	.000	0.00	0.00	.000	0.00	.000	0.00	0.000
95. LUMPENUS SAGITTA	0.000	0.000	.000	0.0	0.00	0.000	0.00	0.00	0.000	0.00	.000	0.00	0.000
96. PHOLIS LAETA	0.000	.269	.4539	0.	0	0.00	0.00	0.00	.000	0.0	.000		.000
97. AMMODYTES HEXAPTERUS	0.000	.6808	0.00	0.000	0.0	0.000	0.00	0.00	0.000	0.0	.2269	0.000	0.00

APPENDIX E

(continued)

SAMPLES

SPECIES	08 07 50 01	08 08 10 01	08 08 30 01	08 08 50 01	08 08 60 01	08 09 20 01	08 09 30 01	08 09 50 01	08 09 60 01	08 10 20 01	08 10 30 01	08 10 60 01	10 02 30 01
MONTH	08	08	08	08	08	08	08	08	08	08	08	08	10
TRANSECT	07	08	08	08	08	09	09	09	09	10	10	10	02
DEPTH	50	10	30	50	60	20	30	50	60	20	30	60	30
REPLICATE	01	01	01	01	01	01	01	01	01	01	01	01	01
98. PLEURONECTIDAE	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
99. PLEURONECTIDAE JUV,	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	,2269	0.000	0.002
100. ATHERESTHES STOMIAS	.0668	0.000	04000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
101. EOPSETTA JORDANI	0,000	0.000	0,000	0*000	,6808	0.000	0.000	0,000	,2269	0.000	0.000	0.000	0.000
102, HIPPOGLOSSOIDES ELASSODON	0.000	0.000	06000	0.000	0.000	0.000	0.000	0,000	0.000	.4539	0.000	0.000	0.000
103. ISOPSETTA ISOLEPIS	0,000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080
104. LEPIDOPSETTA BILINEATA	12.71	,9078	7,716	7.71.4	25.87	4.539	7.262	7.262	19.06	0,000	,4539	8.624	0.000
105. LIMANDA ASPERA	16.34	1.135	0.000	12.94	00039	18.61	7.035	10.89	7.716	49.48	30.41	31.32	0.385
106. LIMANDA PROBOSCIDEA	0.000	0.000	0.000	0.000	04000	,2269	0.000	0.000	0.000	0.000	0.000	.4539	0.000
107, PLATICHTHYS STELLATUS	0.000	6.582	0,000	0,000	00000	0*000	1.816	0.000	0.000	0.000	0*000	0.000	0,000
108. PLEURONECTES QUADRITUBERCULATUS	0,000	0,000	0*000	0.000	0.000	,2269	0.000	0.000	o.000	,9078	3.177	0.000	0.000
109. HIPPOGLOSSUS STENOLEPIS	0.000	,9078	0.000	0.000	0.000	0.000	0*000	0*000	0.000	0,000	0,000	0,000	0,000
110. TOTAL ALGAE	0,000	0,000	0.000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0,000	0.000
111. TOTAL INVERTEBRATES	9.651	4.085	83.14	12.31	3.815	4,?94	8.626	8.851	23.84	4.312	7.262	9.078	9.503
112. TOTAL FISH	29.31	16.71	10.42	20.72	26.59	61.05	20.20	44.94	29.96	51.29	35.63	40.62	0,728
113. TOTAL FLATFISH	29.12	9.532	7.716	20.65	26.59	23.60	16.11	18.16	27.01	50.84	34.27	40.40	0.467
114. TOTAL BIOMASS	38.98	20.79	93,56	33.03	30*41	66.04	28.82	53.79	53.80	55.60	42.89	49.70	10,34
115. NO. SPECIES	15.00	17.00	24.00	9.000	7,000	11.00	17.00	9.000	13.00	5.000	14.00	11.00	27.00
116. DIVERSITY (H)	1.402	2.317	1.397	1.256	.5198	1.439	1.87':5	1.606	1.359	.4479	1.065	1.0?9	1.617
117. EVENNESS	.5177	,8178	, 4394	.5714	.2671	.6001	.6612	0.731	,5297	,2783	.4037	.4584	.4905
118. TOTAL ABUNDANCE	38.98	20.79	93.56	33.03	30.41	66.04	28.82	53.79	53.80	55 .60	42,89	49.70	10.34

APPENDIX E

(continued)

SAMPLES

MONTH	1 0	10	10	10	1()	10	10	10	10	10	10	10	10
TRANSECT	02	02	03	()3	03	03	04	04	04	04	0.4	06	06
DEPTH	5()	6()	20	30	50	60	20	30	50	60	20	50	60
REPLICATE	01	01	01	01	01	()1	01	01	01	01	01	01	01
SPECIES													
1. CHLOROPHYTA	0	0,000	0.00	0.000	0.000	0.000	0*000	0*000	0.000	0.000	0,000	0.000	0.000
2. PHAEOPHYTA	0	0.000	0.00	0.000	2.000	0.000	0*000	0.500	0*000	0.000	0.075	0.000	0.000
3. RHODOPHYTA	0	0.000	0,00	0.000	0.000	0.000	0.000	0.000	0*000	0.000	0 * 000	0.000	0,000
4. ZOSTERA MARINA	0	0.000	O*OO	0.000	0.000	0*000	0.500	0.000	0.000	0.000	20.77	0.000	0.050
5. PORIFERA	0	0.000	0.00	0.000	1.300	0.300	0.000	0.000	00000	0.100	0.000	0.000	0,000
6. HYDROIDA	0	0.000	0.00	0.010	0.000	0.000	0.000	0*000	0.000	0.000	0.010	0.001	0.000
7. ZOOANTHARIA ACTINIARIA	0	0.000	5.50	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8. ANEMONE SP.16	0	0,000	0.00	0.000	0*000	0,000	0.000	0.000	0.000	0.000	0,000	0.000	0,000
9* ZOANTHARIA ACTINIARIA NYNANTHEAE	0	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000
10. METRIDIUM SENILE	0	0.000	0,00	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0 * 000	0.000	0.000
11. POLYCHAETA	0	0.000	0400	0,000	0.000	0.000	0*000	0.000	0,000	0.000	0,000	0.000	0.000
12. POTAMILLA RENIFORMIS	o	0.000	0.21	0,000	0.020	0.000	0.000	0.000	0.000	0,000	0,000	0.000	0.000
13. GASTROPODA	0	0.000	0,00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14. MARGARITAS PUPILLUS	0	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000
15. TRICHOTROPIS INSIGNIS	0	0.000	0.00	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000
16. TRICHOTROPIS CANCELLATA	0	00000	0.00	0,000	0,000	0.000	0.000	0*000	0.000	0.000	0,000	0.000	0.000
17. VELUTINA LAEVIGATA	0	0,000	O*OO	0.000	0,000	0.000	0.000	0,000	0.000	0,000	0.000	0.000	0.000
18. NATICA CLAUSA	0	0.000	0.00	0.000	0.005	0.060	0.000	0.000	0,000	0.005	0,000	0.000	0.000
i?. POLINICES PALLIDA	0	0.000	0.00	0*000	0,000	0.000	0.000	0.005	0.000	o.000	0.000	0.000	0.000
20. FUSITRITON OREGONENSIS	0	0.000	O*OO	0*000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21. NUCELLA SP',	0	0.000	0.00	0.000	0,000	0.000	0 * 000	0.000	0.000	0,000	0,000	0,000	0.000
22. BERINGIUS BERINGI	0	0.000	0.00	0,000	0,000	0.160	0.000	0.000	0.000	0,000	0.000	0.000	0,000
23. LIOMESUS NUX	0	0 * 000	0.00	0.000	00000	0.000	0.000	0.000	0.009	0.000	0,000	0.000	0.000
24• NEPTUNEA LYRATA	0	0,000	0.00	0.000	0,000	0.220	0.000	0.000	0.000	0.015	0,000	0,000	0.000
25• NUDIBRANCHIA	0	0.000	O*OO	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
26. MOPALIA HINDSI	0	0.000	O*OO	0,000	0,000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000
27. BIVALVIA	0	0.001	O*OO	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0.000	0.000	0.000
28. MYTILUS EDULIS	0	0 * 000	0.00	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0 * 000
29. PODODESMUS SP',	0	0.000	0400	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
30, CYCLOCARDIA SP'.	0	0.000	O*OO	0.000	0*000	0.01.0	0.000	0.000	0*000	0.000	0.000	0.000	0.000
31. ASTARTE SP', JUV .	0	0.000	0.00	0.000	0.000	0.000	0.000	0.000	o.000	0.000	0.000	0*000	0.000
32. SERRIPES GROENLANDICUS	0	0.000	0000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000	0.000	0.000
33. SPISULA SP.	0	0.000	0.00	00000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
34. SILIQUA PATULA	0	00000	0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
35. MACOMA SP'.	0	0.000	0,00	0.000	0,000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000
36. TELLINA LUTEA	0	0.000	O*OO	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
37. TELLINA NUCULOIDES	0	0.000	0,00	0.000	0.000	0.000	0,000	0,000	0,000	0.000	0,000	0.000	0.000
38. HIATELLA ARCTICA	0	0,000	0,00	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
39. CIRRIPEDIA	0	0.000	0.55	0.000	0.000	0.000	0.000	0.000	0 * 000	0.000	0,000	0.000	0.000
40. DECAPODA	0	0.000	0.00	0.000	0.010	0.000	0.000	0.000	0*000	00000	0.000	0.000	0.000
41. HIPPOLYTIDAE	()	0.11.0	0.00	0.020	0.390	0.104	0.421	1.220	0.141	0.000	0.460	0. 025	0.195
42. PAGURIDAE	o	0.000	0,00	0.001	0.320	0.045	0.325	0.000	0.000	0.010	0,000	o.000	0.000
4.3, PARALITHODES CAMTSCHATICA	0	0.000	0400	0.000	0.000	0, 000	0.000	0.000	0.000	0.000	0,000	0.000	0,000
44. MAJIDAE	0	0.000	0*00	0,000	0.000	0.000	0.000	0,000	0*000	0.000	0,000	0.000	0,000
45. OROGONIA GRACILIS	0	0.000	0.00	0.000	0.000	0.000	0.010	0.005	0*000	0,000	0.000	0.000	0.000
46. HYAS LYRATUS	()	().0()()	0.00	0.000	0.000	0.001	0.000	0.000	0.000	0 * 000	0.000	00000	0.000
47. CHIONIECETES SP.	0	0.000	0.00	0,000	0.000	0.000	0.000	0.000	0.000	0.010	o * 000	0.000	0.000
48. CHIONOECETES OPILIO	0	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0,000

APPENDIX E

(continued)

SAMPLES

SPECIES													
MONTH	10	10	10	10	10	10	10	10	10	10	10	10	10
TRANSECT	02	02	03	03	03	03	04	04	04	04	06	06	06
DEPTH	50	60	20	30	50	60	20	30	50	60	20	50	60
REPLICATE	01	01	01	01	01	01	01	01	01	01	01	01	01
49. CHIONOECETES BAIRDI	0.000	0.000	0.000	0.001	0.02	0.000	0.000	0.000	0.043	0.000	0.000	0.000	0.025
50. PUGETTIA GRACILIS	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
51. TELMESSUS CHEIRAGONUS	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52. CANCER MAGISTER	0.000	0.000	0.600	0.270	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
53. CANCER OREGONENSIS	0.000	0.000	0.020	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54. ECTOPROCTA	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
55. ASTEROIDEA	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56. SOLASTER SP.	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
57. PTERASTER SP.	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
58. HENRICIA LEVIUSCULA	0.000	0.000	0.070	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
59. ASTERIAS AMURENSIS	0.00	0.005	0.000	9.000	1.40	1.405	0.000	0.000	0.090	0.040	0.000	0.450	0.065
60. STYLASTERIAS SP.	0.00	0.000	0.000	0.000	0.75	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000
61. OPHIUROIDEA	0.001	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62. STRONGYLOCENTROTUS DROEBACHIENSIS	0.000	0.000	0.000	0.000	0.00	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
63. DENDRASTER EXCENTRICUS	0.000	0.002	0.000	0.000	0.00	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000
64. HOLOTHUROIDA	0.000	0.000	0.000	0.000	0.01	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000
65. ASCIDIACEA, COMPOUND	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
66. ASCIDIACEA, SOLITARY	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
67. DENDRODOA AGGREGATA	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
68. BOLTENIA OVIFERA	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000
69. HALOCYNTHIA AURANTIUM	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70. RAJA ABYSSICOLA	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
71. RAJA BINOCULATA	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
72. OSTEICHTHYES	0.000	0.000	0.000	0.000	0.00	0.000	0.060	0.000	0.000	0.000	0.000	0.000	0.000
73. CLUPEIDAE	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
74. CLUPEA HARENGUS PALLASI	0.000	0.000	0.000	0.000	0.00	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000
75. OSMERUS MORDAX	0.000	0.000	0.000	0.000	0.00	0.000	0.110	0.000	0.000	0.000	0.000	0.000	0.000
76. ALLOSMERUS ELONGATUS	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
77. GADIDAE	0.000	0.000	0.000	0.000	0.00	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000
78. GADIDAE, JUV.	0.042	0.070	0.490	0.770	0.00	0.000	0.300	0.000	0.090	0.300	0.070	0.002	0.000
79. GADUS MACROCEPHALUS	0.000	0.000	0.000	0.000	0.48	4.000	0.000	0.000	0.010	3.000	0.005	0.000	0.330
80. MICROGADUS PROXIMUS	0.000	0.000	0.000	0.000	0.30	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000
81. THERAGRA CHALCOGRAMMA	0.002	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.100	0.000	0.000	0.040	0.025
82. ZOARCIDAE	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.040	0.000	0.000	0.000	0.000
83. COLOLABIS SAIRA	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
84. GASTEROSTEUS ACULEATUS	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
85. HEXAGRAMMIDAE	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
86. HEXAGRAMMOS LAGOCEPHALUS	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
87. HEXAGRAMMOS OCTOGRAMMUS	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
88. HEXAGRAMMOS STELLERI	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
89. ANOPLOPOMA FIMBRIA	0.000	0.000	0.000	0.000	0.00	0.000	0.010	0.005	0.000	0.000	0.000	0.000	0.000
90. COTTIDAE	0.000	0.000	2.100	0.000	0.00	0.162	0.200	0.000	0.000	0.000	0.020	0.000	0.000
91. AGONIDAE	0.000	0.000	0.080	0.000	0.00	0.000	0.200	0.085	0.000	0.001	0.030	0.000	0.000
92. LIPARIS SP.	0.000	0.000	0.040	0.015	0.00	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000
93. TRICHODON TRICHODON	0.000	0.000	0.000	0.020	0.00	0.000	0.000	0.015	0.010	0.000	0.000	0.000	0.000
94. ANOPLARCHUS SP.	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
95. LUMPENUS SAGITTA	0.000	0.000	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
96. PHOLIS LAETA	0.000	0.000	0.00	0.000	0.0	0.000	0.00	0.00	0.000	0.000	0.00	0.00	0.0
97. AMMODYTES HEXAPTERUS	0.000	0.000	0.150	0.000	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

APPENDIX E

(continued)

SAMPLES

MONTH	10	10	10	10	10	10	10	10	10	10	10	10	10
TRANSECT	02	02	03	03	03	03	04	04	04	04	06	06	06
DEPTH	50	60	20	30	50	60	20	30	50	60	20	50	60
REPLICATE	()1	01	01	01	01	01	01	01	01	01	01	01	01
SPECIES													
98. PLEURONECTIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0*OOO	0,000	0 * 000	0.000	0.000	0.000
99. PLEURONECTIDAE JUV.	0.001	0.002	0.890	0,040	0.125	0.004	o.000	0.000	0,000	0 * 000	0.200	0.015	0.000
100. ATHERESTHES STOMIAS	0.000	0.000	0,000	0.230	0.750	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.835
101. EOPSETTA JORDANI	0.000	0.000	0.000	0,000	0.000	0*000	0.000	00000	0.000	0.000	0.000	0.000	0,000
102. HIPPOGLOSSOIDES ELASSODON	0.285	0.000	0.000	1.000	1.500	0.350	0,000	0.060	1.000	0.000	0.000	0.000	0.200
103, ISOPSETTA ISOLEPIS	0.000	0.000	0. 000	0.000	0,000	0.000	0.000	0,000	0,000	0. 000	0. 000	0.000	0.150
104. LEPIDOPSETTA BILINEATA	1.040	1.500	1.500	0,740	0.000	0.000	0.000	0.185	00130	1.000	0.000	0.075	3*000
105. LIMANDA ASPERA	0.530	7.500	32.50	19.00	10.00	0.000	2.000	14.00	, 0425	10.00	0.000	10.00	11.50
106. LIMANDA PROBOSCIDEA	0. 000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0,000	0.000	0. 000	0. 000	0.000
107. PLATICHTHYS STELLATUS	0,000	0.000	1*250	2.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
108. PLEURONECTES QUADRITUBERCULATUS	0.000	0.000	5.000	1. 500	1, 750	0.000	0.075	0*000	0.750	0.825	0,400	0,000	0.000
109. HIPPOGLOSSUS STENOLEPIS	0.000	0.000	.0044	1.000	0,000	0.000	0.000	0.000	0.000	0.500	0.040	0.000	0.000
110. TOTAL ALGAE	0.000	0.000	0,000	0.000	2,000	0.000	0,000	0.500	0. 000	0.000	0.075	0.000	0.000
111. TOTAL INVERTEBRATES	0.001	0.164	11.03	10.10	4.225	3.091	1.256	1. 230	0.274	0.142	21.30	0.476	0.335
112. TOTAL FISH	1.900	9.072	45.00	27.82	14.90	4.516	3.035	15.35	3.002	15.63	0.765	10.14	16.04
113. TOTAL FLATFISH	1.856	9.002	41.14	26.01	14.13	0.354	2.075	14.24	1.942	12.32	0,640	10.09	15.68
114, TOTAL BIOMASS	1.901	9.236	56.04	37.92	21.13	7.607	4.291	17.08	3.276	15.77	22.14	10.61	16.37
115. NO. SPECIES	7.000	9.000	18.00	18,00	18.00	16.00	10.00	11.00	10*OO	13.00	11.00	8.000	11*OO
116. DIVERSITY (H)	1.070	.5879	1.584	1.573	1.896	1.580	1.754	,7296	1.696	1.171	.3415	, 2742	.9985
117. EVENNESS	,3499	.2676	.5479	.5442	0.656	,5699	.7616	.3043	,7368	.4565	,1424	*1319	.4164
118. TOTAL ABUNDANCE	1.901	9.236	56.04	37.92	21.13	7.607	4.291	17.08	3,276	15.77	22.14	10.61	16.37

APPENDIX E
(continued)

SAMPLES

SPECIES	10 / 07 / 50 / 01	10 / 07 / 60 / 01	10 / 09 / 20 / 01	10 / 09 / 30 / 01	10 / 09 / 50 / 01	10 / 09 / 60 / 01	10 / 10 / 20 / 01	10 / 10 / 30 / 01	10 / 10 / 50 / 01	10 / 10 / 60 / 01	10 / 11 / 20 / 01	10 / 11 / 30 / 01	10 / 11 / 50 / 01
MONTH / TRANSECT / DEPTH / REPLICATE	10 / 07 / 50 / 01	10 / 07 / 60 / 01	10 / 09 / 20 / 01	10 / 09 / 30 / 01	10 / 09 / 50 / 01	10 / 09 / 60 / 01	10 / 10 / 20 / 01	10 / 10 / 30 / 01	10 / 10 / 50 / 01	10 / 10 / 60 / 01	10 / 11 / 20 / 01	10 / 11 / 30 / 01	10 / 11 / 50 / 01
1. CHLOROPHYTA	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
2. PHAEOPHYTA	0.000	0.000	0.050	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.042	0.035	0.000
3. RHODOPHYTA	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
4. ZOSTERA MARINA	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
5. PORIFERA	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
6. HYDROIDA	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
7. ZOOANTHARIA ACTINIARIA	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
8. ANEMONE SP. 16	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
9. ZOANTHARIA ACTINIARIA NYNAN HEAE	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
10. METRIDIUM SENILE	0.000	0.000	0.050	0.000	0.00	0.000	0.00	0.00	0.900	0.000	0.000	0.000	0.000
11. POLYCHAETA	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
12. POTAMILLA RENIFORMIS	0.000	0.000	0.000	0.000	0.00	0.000	0.00	0.00	0.000	0.000	0.850	0.000	0.000
13. GASTROPODA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
14. MARGARITES PUPILLUS	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
15. TRICHOTROPIS INSIGNIS	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
16. TRICHOTROPIS CANCELLATA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
17. VELUTINA LAEVIGATA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
18. NATICA CLAUSA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.005	0.000	0.005	0.000
19. POLINICES PALLIDA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
20. FUSITRITON OREGONENSIS	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.170	0.000	0.000	0.000
21. NUCELLA SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
22. BERINGIUS BERINGI	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
23. LIOMESUS NUX	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
24. NEPTUNEA LYRATA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
25. NUDIBRANCHIA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
26. MOPALIA HINDSI	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
27. BIVALVIA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
28. MYTILUS EDULIS	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
29. PODODESMUS SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
30. CYCLOCARDIA SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
31. ASTARTE SP. JUV.	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
32. SERRIPES GROENLANDICUS	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
33. SPISULA SP.	0.000	0.005	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
34. SILIQUA PATULA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
35. MACOMA SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
36. TELLINA LUTEA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.000	0.000	0.000	0.000	0.000
37. TELLINA NUCULOIDES	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00	0.00
38. HIATELLA ARCTICA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00	0.00
39. CIRRIPEDIA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00	0.00
40. DECAPODA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00	0.00
41. HIPPOLYTIDAE	0.335	0.040	0.357	0.000	[illegible]	0.265	0.69	0.04	0.30	0.060	0.002	0.10	0.20
42. PAGURIDAE	0.180	0.050	0.000	0.000	0.4	0.001	0.00	0.00	0.00	0.090	0.003	0.80	0.05
43. PARALITHODES CAMTSCHATICA	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00	0.00
44. MAJIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00	0.00
45. OROGONIA GRACILIS	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.15	0.000	0.000	0.00	0.30
46. HYAS LYRATUS	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00	0.00
47. CHIONIECETES SP.	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00	0.00
48. CHIONOECETES OPILIO	0.000	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00	0.000	0.000	0.00	0.00

APPENDIX E

(continued)

SAMPLES

MONTH	10	10	10	10	10	10	10	10	10	10	10	10	10
TRANSECT	07	()7	()Y	09	09	09	10	10	10	10	11	11	11
DEPTH	50	60	20	30	50	60	20	30	50	60	20	30	50
REPLICATE	01	01	()1	01	01	01	01	01	01	01	01	01	01
SPECIES													
49. CHIONOECETES BAIRDI	O*OOO	0.000	0*000	0*000	0,000	0,000	0.000	0.000	0.000	0.000	0.000	0,000	0.000
50. PUGETTIA GRACILIS	00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0.000	0.000	0.000
51. TELMESSUS CHEIRAGONUS	0.000	0.000	0.000	0,000	00000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000
52. CANCER MAGISTER	00000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0,000	0.000	0.000	0.000
53. CANCER OREGONENSIS	00000	0.000	0.000	0*000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
54. ECTOPROCTA	0.000	0.000	0,000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.010
55. ASTEROIDEA	0,000	0.000	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0,000	0.000	0.000	0.000
56. SOLASTER SP.	0.000	0.000	0,000	0.000	0.000	o.000	0.000	0.000	0.000	0,000	0,000	0.000	0,000
57. PTERASTER SP.	0.000	0.000	0.000	0,000	0.000	0,000	0.000	0.000	0.000	0*000	0.000	0,000	0.000
58. HENRICIA LEVIUSCULA	0*000	0.000	00000	0.000	0.000	0.000	0.000	0.000	0*000	o.000	0.000	0,000	0,000
59. ASTERIAS AMURENSIS	0.815	9.645	0.050	0,018	5.500	2.500	1.000	0.480	2.475	0.000	0.000	1.260	0.500
60. STYLASTERIAS SP.	0.000	0.000	0.000	0.000	0*000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000
61. OPHIUROIDEA	0.000	0.000	0.000	0.000	0.000	00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
62. STRONGYLOCENTROTUS DROEBACHIENSIS	0,000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000
63. DENDRASTER EXCENTRICUS	0.185	0.000	0.000	0.000	0.002	0.200	0*000	0.000	0.000	0.175	0.000	0,030	0.000
64. HOLOTHUROIDA	0,000	0.000	0.000	0*000	0.000	0.000	00000	0.000	0.000	0.000	0.000	0.000	0.000
65. ASCIDIACEA, COMPOUND	0,000	0.000	0.170	0,000	0.000	0.000	0.000	0,000	0,000	0.000	0.000	0,300	0,000
66. ASCIDIACEA, SOLITARY	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
67, DENDRODOA AGGREGATA	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0*000	04000	0.000	0.000
68. BOLTENIA OVIFERA	0.035	0*000	0.030	0.050	0.010	0*000	0.000	0,000	0.160	1.589	0.060	0.120	0.570
69. HALOCYNTHIA AURANTIUM	0.000	0.000	0.000	0*000	0.000	o.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70. RAJA ABYSSICOLA	0.000	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
71* RAJA BINOCULATA	0.000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0*000	0*000	0.000	0.000	0.000
72. OSTEICHTHYES	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0,000	0*000	0,000	0,000	0.000	0.000
73* CLUPEIDAE	0,000	0*000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
74. CLUPEA HARENGUS PALLASI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0,000	0,000
75. OSMERUS MORDAX	0.000	0*000	0,030	0.090	0.000	0.000	0.000	0.000	0.000	0,000	0.100	0.055	0.000
76. ALLOSMERUS ELONGATUS	0,000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
77. GADIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.210	0.000	0*000	0.000	0.000	0,000
78. GADIDAE, JUV.	4.250	0.160	2.810	0.240	0,830	0.590	0.200	0.000	0.410	2.525	0.190	0,630	0.815
79. GADUS MACROCEPHALUS	0.000	6.173	8.057	0.000	2.837	0.750	2.950	0,000	0.000	0.000	0.000	0.000	0*000
80. MICROGADUS PROXIMUS	0.000	0.000	0.000	0.000	00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
81. THERAGRA CHALCOGRAMMA	0.000	0.120	0.275	0.000	0.000	04000	0.055	0.000	0.000	0.000	0.000	0*000	0,000
82. ZOARCIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000
83. COLOLABIS SAIRA	0,000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000
84. GASTEROSTEUS ACULEATUS	0*000	0.000	0.000	0.000	0*000	0.000	0.000	0*000	0.000	0.001	0.000	0.000	0,000
85. HEXAGRAMMIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0,000	0,000	0.000	0.000	0.012
86. HEXAGRAMMOS LAGOCEPHALUS	0.000	0.000	0.000	0.000	00000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
137. HEXAGRAMMOS OCTOGRAMMUS	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0,000
88* HEXAGRAMMOS STELLERI	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0*000	0.000	0.000	0.000	0.012
89. ANOPLOPOMA FIMBRIA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0,000
90+ COTTIDAE	0,090	0,000	0,004	0.000	0.020	0.750	0.000	2.533	0.000	0.000	.5674	0,002	0.002
91, AGONIDAE	0*000	0.000	0.020	0.000	0.001	0.000	0.005	0.072	0.005	0.000	0.006	0.010	0.002
92. LIPARIS SP.	0.010	0.000	0.030	0.000	0.003	0.005	0.015	0.000	0.000	0.000	0.000	0.000	0.000
93. TRICHODON TRICHODON	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0*000	0.020	08000	0.000	0.000	0.000
94. ANOPLARCHUS SP.	0.000	0.000	0.000	00000	0.000	0*000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
95. LUMPENUS SAGITTA	0,000	0,000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000
96. PHOLIS LAETA	0.000	0,000	0,000	0.000	0.000	0.000	0.000	0,000	0,000	0.000	0.000	0.000	0.000
'?7. AMMODYTES HEXAPTERUS	0,000	0,000	0.000	0.020	0.012	0.000	0.000	0.000	0*000	0.015	0.000	0.040	0.000

APPENDIX E

(continued)

SAMPLES

	MONTH	10	10	10	10	10	10	10	10	10	10	10	10	10
	TRANSECT	07	07	09	09	09	09	10	10	10	10	11	11	11
	DEPTH	50	60	20	30	50	60	20	30	50	60	20	30	50
	REPLICATE	()1	()1	01	01	01	01	01	01	01	01	01	01	01
SPECIES														
98.	PLEURONECTIDAE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000
99.	PLEURONECTIDAE JUV,	0.325	0.000	0, 290	0.050	0.175	0.190	0.003	1.360	0.000	0.020	0.000	0.000	0,015
100.	ATHERESTHES STOMIAS	O*11O	0*000	0*000	04000	0.000	0.000	0*000	0 * 000	0.000	0.000	0.000	0,000	0.000
101..	EOPSETTA JORDANI	0.000	o * 000	o * 000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
102.	HIPPOGLOSSOIDES ELASSODON	0.380	0.000	0.000	0.000	0*000	0.000	0.010	0.000	0.000	0.085	0.000	0.000	0.000
103.	ISOPSETTA ISOLEPIS	0.000	0.000	0.000	0*000	0.000	0.000	0*000	0.000	0.000	0 . 000	0.000	0*000	0,000
104*	LEPIDOPSETTA BILINEATA	12.50	3.064	0.000	0.150	4.500	40000	0*000	.4539	3.041	10.00	1.135	.4539	1.475
105.	LIMANDA ASPERA	5.500	3.404	2.500	8.730	1.000	2.500	1.500	41.65	,5901	1.929	8.034	0.250	0.170
106.	LIMANDA PROBOSCIDEA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000
107*	PLATICHTHYS STELLATUS	0.000	0.000	9.418	0*000	0.000	0.000	0,000	0.310	0.000	0.000	0,000	0.000	0.000
1.08.	PLEURONECTES QUADRITUBERCULATUS	0,000	0,000	0.000	0.140	0.000	0,000	5.000	1.475	0.000	1.000	0.000	0.000	0 * 000
109.	HIPPOGLOSSUS STENOLEPIS	1.081	0.230	0.000	0. 000	0.090	0.000	0.000	0.000	0.000	0, 000	1.362	0,000	0.000
110.	TOTAL ALGAE	0.000	0.000	0.050	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.042	0.035	0,000
111.	TOTAL INVERTEBRATES	1.550	9.840	0.587	0.078	5.842	2.966	1.690	0.520	3.750	2.179	0.916	1. 530	1.135
112.	TOTAL FISH	24.25	13.15	23.43	9*428	9.468	8.785	9.738	4.9.06	4.066	15.58	11.39	1.441	2.503
113*	TOTAL FLATFISH	19.90	6.698	12.21	9.078	5.765	6.690	6.513	45.?4	3*631	13.03	10.53	. 7039	1..560
114.	TOTAL BIOMASS	25.80	22.99	24*24	9.516	15.31	11.75	11.43	48.58	7.816	17.75	12.35	3.306	3.638
115.	NO. SPECIES	14.00	10*OO	16.00	11.00	15.00	11.00	11.00	11.00	1.0.00	15. ()()	13.00	16.00	14.00
116.	DIVERSITY (H)	1.518	1 *423	1.507	.4371	1.571	1.752	1.477	.6531	1, 520	1.425	1.224	1.878	1. 569
117.	EVENNESS	.3754	.6181	, S436	,1823	0.580	,7308	.6161	.2723	0.660	,5261	,4773	.6775	.5947
118.	TOTAL ABUNDANCE	25.80	22.99	24.24	9.516	15.31	11.75	11.43	48.58	7.816	17.75	12.35	3.306	3.638

APPENDIX E

(continued)

	SAMPLES
MONTH	10
TRANSECT	11
DEPTH	60
REPLICATE	01
SPECIES	
1. CHLOROPHYTA	0.000
2. PHAEOPHYTA	0.000
3. RHODOPHYTA	0.000
4. ZOSTERA MARINA	0.020
5. PORIFERA	0.000
6. HYDROIDA	0.000
7. ZOOANTHARIA ACTINIARIA	0.000
8. ANEMONE SP. 16	0.000
9. ZOANTHARIA ACTINIARIA NYNANTHEAE	0.000
10. METRIDIUM SENILE	0.000
11. POLYCHAETA	0.000
12. POTAMILLA RENIFORMIS	0.000
13. GASTROPODA	0.000
14. MARGARITES PUPILLUS	0.000
15. TRICHOTROPIS INSIGNIS	0.000
14. TRICHOTROPIS CANCELLATA	0.000
17. VELUTINA LAEVIGATA	0.000
18. NATICA CLAUSA	0.000
19. POLINICES PALLIDA	0.000
20. FUSITRITON OREGONENSIS	0.000
21. NUCELLA SP.	0.000
22. BERINGIUS BERINGI	0.000
23. LIOMESUS NUX	0.000
24. NEPTUNEA LYRATA	0.000
25. NUDIBRANCHIA	0.000
26. MOPALIA HINDSI	0.000
27. BIVALVIA	0.000
28. MYTILUS EDULIS	0.000
29. PODODESMUS SP.	0.000
30. CYCLOCARDIA SP.	0.000
31. ASTARTE SP. JUV.	0.000
32. SERRIPES GROENLANDICUS	0.000
33. SPISULA SP.	0.000
34. SILIQUA PATULA	0.000
35. MACOMA SP.	0.000
36. TELLINA LUTEA	0.000
37. TELLINA NUCULOIDES	0.000
38. HIATELLA ARCTICA	0.000
39. CIRRIPEDIA	0.000
40. DECAPODA	0.000
41. HIPPOLYTIDAE	0.135
42. PAGURIDAE	0.210
43. PARALITHODES CAMTSCHATICA	0.000
44. MAJIDAE	0.000
45. OROGONIA GRACILIS	0.075
46. HYAS LYRATUS	0.000
47. CHIONIECETES SP.	0.005
48. CHIONOECETES OPILIO	0.000

APPENDIX E

(continued)

SPECIES	SAMPLES 10 11 60 01 . -
98. PLEURONECTIDAE	0.000
990 PLEURONECTIDAE JUV.	0.050
100. ATHERESTHES STOMIAS	0.000
1.01. EOPSETTA JORDANI	0.000
102. HIPPOGLOSSOIDES ELASSODON	1*000
103. ISOPSETTA ISOLEPIS	0.000
104. LEPIDOPSETTA BILINEATA	8$000
103. LIMANDA ASPERA	1.250
106, LIMANDA PROBOSCIDEA	0,000"
107, PLATICHTHYS STELLATUS	0, 000
1013, PLEURONECTES QUADRITUBERCULATUS	0.000
109. HIPPOGLOSSUS STENOLEPIS	0.000
110. TOTAL ALGAE	0.000
111. TOTAL INVERTEBRATES	7.111
112. TOTAL FISH	17.67
113. TOTAL FLATFISH	10*30
114. TOTAL BIOMASS	24.90
115. NO. SPECIES	20.00
116. DIVERSITY (H)	2.087
117. EVENNESS	.6967
118. TOTAL ABUNDANCE	24*90

APPENDIX F

RAW DATA FROM SEA OTTER SURVEYS

JUNE 1982

DISTANCE OFFSHORE (MILES)	2 A	2 B	3 A	3 B	4 A	4 B	5 A	5 B	6 A	6 B	7 A	7 B	8 A	8 B	9 A	9 B	10 A	10 B	11 A	11 B	12 A	12 B
o- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	0	0	2	0	0	0
2- 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4- 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6- 8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
8-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
12-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	o	0	0	0	0	0
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

JUNE 1982

DISTANCE OFFSHORE (MILES)	13 A	13 B	14 A	14 B	15 A	15 B	16 A	16 B	17 A	17 B	18 A	18 B	19 A	19 B	20 A	20 B	21 A	21 B	22 A	22 B	23 A	23 B
0- 2	0	0	0	0	o	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
2- 4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4- 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
6- 8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0
12-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
20-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX F

(continued)

JUNE 1982

DISTANCE OFFSHORE (MILES)	24 A	24 B	25 A	25 B	26 A	26 B	27 A	27 B	28 A	28 B	29 A	29 B	30 A	30 B	31 A	31 B	32 A	32 B	33 A	33 B	34 A	34 B
0- 2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
2- 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	.
4- 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0
6- 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-14	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-22	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0
22-24		0	0	0	0	0		0	0		0			0	0	0		0	0	0		0
24-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

JUNE 1982

DISTANCE OFFSHORE (MILES)	35 A	35 B	39 A	39 B	4° A	4° B	4 A	4 B	42 A	42 B	43 A	43 B	A	B	A	B	A	B	A	B	A	B
0- 2	6	1	0	.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4- 6	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
6- 8	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
8-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-14	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-16	0	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-22	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-24		0	0	0				0		0	0	0	0	0	0	0		0	0	0		
24-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX F
(continued)

DISTANCE OFFSHORE (MILES)	AUGUST 982 2 A	2 B	3 A	3 B	4 A	4 B	5 A	5 B	6 A	6 B	7 A	7 B	8 A	8 B	9 A	9 B	10 A	10 B	11 A	11 B	2 A	2 B
0- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	-	1	2	0	0	1
2- 4	1	0	0	0	0	0	1	2	0	0	0	0	0	0	0	1	0	1	0	1	0	0
4- 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	1	0
6- 8	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	0	-	0	0	0	0	0
8-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
10-12	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

DISTANCE OFFSHORE (MILES)	AUGUST 982 3 A	3 B	4 A	4 B	5 A	5 B	[illegible] A	[illegible] B	17 A	17 B	8 A	8 B	19 A	19 B	20 A	20 B	[illegible] A	[illegible] B	22 A	22 B	23 A	23 B
0- 2	0	0	0	0	0	0	0	3	4	1	2	0	0	0	0	0	4	4	1	6	0	52
2- 4	0	0	0	0	7	8	0	1	4	0	0	0	0	1	0	9	2	0	0	0	0	0
4- 6	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	2	0	0	0	1	0
6- 8	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
8-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0
12-14	0	0	0	0	3	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	2	0
14-16	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-24		0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
24-26	0	0	0	0		0	0	0		0	0	0	0	0	0	0	0		0	0	0	0
26-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX F

(continued)

AUGUST 982

DISTANCE OFFSHORE (MILES)	24 A	24 B	25 A	25 B	26 A	26 B	27 A	27 B	28 A	28 B	29 A	29 B	30 A	30 B	31 A	31 B	32 A	32 B	33 A	33 B	34 A	34 B
0- 2	0	0	1	2	0	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- 4	0	100	4	4	3	0	1	1	0	0	12	0	0	0	0	0	0	0	2	0	0	0
4- 6	15	66	0	0	0	0	0	0	0	0	3	0	0	0	.	0	0	0	0	0	0	0
6- 8	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
12-14	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0
14-16	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AUGUST 982

DISTANCE OFFSHORE (MILES)	35 A	35 B	39 A	39 B	40 A	40 B	41 A	41 B	42 A	42 B	43 A	43 B	A	B	A	B	A	B	A	B	A	B
0- 2	0	0	8	0	3	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0
2- 4	0	0	0	0	0	0	0	0	1	0	0	-	0	0	0	0	0	0	0	0	0	0
4- 6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6- 8	0	0	0	0	0	0	0	0	3	5	0	0	0	0	0	0	0	0	0	0	0	0
8-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	.	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX F

(continued)

DISTANCE OFFSHORE (MILES)	OCTOBER 1982 2 A	B	3 A	B	4 A	B	5 A	B	6 A	B	7 A	B	8 A	B	9 A	B	10 A	B	11 A	B	12 A	B
0- 2	0	0	0	0	0	2*	1	1	0	0	1	0	6	1	0	1	0	1	0	0	0	0
2- 4	0	0	0	0	0	0	1	0	1	0	0	0	2	1	2	1	0	1	0	0	3	3
4- 6	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	2
6- 8	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	.	0	0	0
8-10	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

DISTANCE OFFSHORE (MILES)	OCTOBER 1982 13 A	B	14 A	B	15 A	B	16 A	B	17 A	B	18 A	B	19 A	B	20 A	B	21 A	B	22 A	B	23 A	B
0- 2	0	0	0	0	0	0	0	0	0	2	0	0	1	4	0	0	0	0	2	4	0	0
2- 4	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	2	2	0	0
4- 6	0	0	0	0	0	0	0	0	.	1	1	0	0	0	0	0	1	0	1	0	0	1
6- 8	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
8-10	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	<	1	0	0	3
10-12	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	.	0	0	0	0
12-14	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	2
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	.	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
20-22	0	0	0	.	0	0	0	0	0	0	0	0		3	0	0	0	0	0	4	0	0
22-24			0	0	0	0	0	0		0	0	0	0		0	0	0	0	0	0	0	0
24-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
26-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0
28-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX F

(continued)

DISTANCE OFFSHORE (MILES)	OCTOBER 982 24 A	B	25 A	B	26 A	B	²7 A	B	28 A	B	2³ A	B	3○ A	B	3 A	B	3² A	B	33 A	B	34 A	B
0- 2	0	0	1	1	0	1	0	0	0	2	0	0	4	0	1	0	0	1	0	0	0	0
2- 4	3	4	1	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
4- 6	1	5	1	2	0	0	0	0	3	1	1	20	0	0	0	0	.	0	0	0	0	0
6- 8	1	1	5	3	0	1	0	0	1	0	5	4	1	0	1	1	0	3	0	0	0	0
8-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12-14	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0
22-24	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-26	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0		0	0		0	0
26-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

DISTANCE OFFSHORE (MILES)	OCTOBER ' 9³2 35 A	B	39 A	B	40 A	B	4 A	B	42 A	B	43 A	B	A	B	A	B	A	B	A	B	A	B
0- 2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- 4	0	2	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4- 6	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6- 8	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10	0	0	0	0	0	0	0	0	0	0	-	2	0	0	0	0	0	0	0	0	0	0
10-12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
12-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
20-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-24	0	0		0	0	0		0	0	0	0	0		0	0	0	0	0	0	0	0	0
24-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX F

(continued)

DISTANCE OFFSHORE (MILES)	MARCH 1983 13 A	13 B	14 A	14 B	15 A	15 B	16 A	16 B	17 A	17 B	18 A	18 B	19 A	19 B	20 A	20 B	21 A	21 B	22 A	22 B	23 A	23 B
0- 2	0	0	3	5	0	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0
2- 4	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4- 6	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6- 8	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0
8-10	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
10-12	0	0	0	0	0	1	1	0	0	0	1	0	1	2	0	0	1	0	0	0	0	0
12-14	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
14-16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
20-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-30	0	0	0	0	o	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

DISTANCE OFFSHORE. (MILES)	MARCH 1983 2 A	2 B	3 A	3 B	4 A	4 B	5 A	5 B	6 A	6 B	7 A	7 B	8 A	8 B	9 A	9 B	10 A	10 B	11 A	11 B	12 A	12 B
0- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
2- 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
4- 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
6- El	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX F

(continued)

MARCH 1983

DISTANCE OFFSHORE (MILES)	24		25		26		27		28		29		30		3		32		33		34	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
0- 2	0	0	0	0	0	0	*	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
2- 4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0
4- 6	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	0	-	0	0	0	0	0
6- 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1
8-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
10-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
12-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
14-16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
20-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26-28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MARCH 983

DISTANCE OFFSHORE (MILES)	35		39		40		41		42		43											
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
0- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- 4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4- 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6- 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-12	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
12-14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14-16	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24-26	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
26-28	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0