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Shelled benthic fauna of the eastern Chukchi Sea, Alaska.

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Topic: Shelled animals of the Arctic Ocean

Open File Report M-77-672

Samples collected in August 1974 from the eastern Chukchi Sea by the U.S. Geological Survey have been examined to determine the species of shelled animals living on the seafloor, the distribution of these animals, and environmental factors that may be controlling their distribution. Studies such as this one are required to develop an understanding of biological features of the region that might be affected by man's activities. Future offshore oil leases proposed by the Federal Government and the State of Alaska require a biological data base from which environmental impact reports can be derived.

A list of 90 species has been compiled, distribution maps have been plotted to demonstrate occurrences of species, and a computer analysis of the data performed. Data from other sources can be added to the computer analysis to enlarge the scope of the information presented.

SHELLED BENTHIC FAUNA
OF THE
EASTERN CHUKCHI SEA

BY

Dennis M. Mann

United States
Department of the Interior
Geological Survey

Open File Report M-77-672

This report is preliminary and has not been
edited or reviewed for conformity with
Geological Survey standards and nomenclature

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INTRODUCTION

The purposes of this study were to identify the benthic shelled infauna and epifauna of the eastern Chukchi Sea, compile species lists and distribution maps, determine recurrent groups of species (communities), and examine the environmental parameters that may control the distribution of the faunal groups. The study was partly supported by the Bureau of Land Management through an interagency agreement with the National Oceanic and Atmospheric Administration, under which a multi-year program responding to the needs of petroleum development of the Alaskan continental shelf is managed by the Outer Continental Shelf Environmental Assessment Program (OCSEAP) Office. The objective of this study is to provide an assessment of the biological patterns of the region as related to petroleum development. Future offshore oil leases proposed by the State of Alaska and the Federal Government require a biological data base from which impact statements can be derived.

Samples used in this report were collected by the U.S. Geological Survey in August 1974 from the U.S. Coast Guard Cutter *Burton Island* under the direction of Arthur Grantz. Sampling was conducted using van Veen grabs, gravity cores, dart cores, and bottom dredges. Only the van Veen grabs contained material useful for this study. At present 103 samples containing 90 species have been examined.

PREVIOUS WORK AND ACKNOWLEDGEMENTS

The areal distribution of benthic faunas is not well known in the Chukchi Sea although most of the fauna has been adequately described. The earliest studies of the region were conducted by the International Polar Expedition to Point Barrow, Alaska, 1881-1883 (Ray, 1885). Their main task was meteorological in nature, and they were not well equipped to study the biology. W.H. Dall did identify and list 33 species and 2 varieties of mollusks collected by this expedition, over two-thirds of which were beach collected (Dall, 1885). The Canadian Arctic Expedition of 1913-1918 collected 26 species and 3 varieties (all were washed up on the beach) which were reported by Dall (1919).

George and Nettie MacGinitie, while at the Naval Arctic Research Laboratory at Point Barrow, carried out the first extensive dredging operation of the sea floor in the Arctic north of the Alaskan coast to study benthic organisms. They used dog teams to haul dredges through holes cut in the ice pack. Stations occupied in this manner ranged from shoreline to 16 miles offshore. The results were published by George MacGinitie (1955), and a complete study of the marine mollusks was subsequently published by Nettie MacGinitie (1959).

Soviet expeditions of the 1930's collected a large amount of data in the Chukchi Sea and on the Siberian coast. Analyses of these data were reported by Gorbunov (1952), Ushakov (1952), and Filatova (1954, 1957). Other Soviet papers that were useful in identifying the molluscan fauna were by Merklin and others (1962) and Petrov (1966).

Recent reviews of specific fauna are especially useful in distinguishing the species of the various genera found in the Arctic waters. These include works by E.V. Coan on the Tellinidae (1971), F.S. MacNeil on Pectinidae (1967), and Mya (1965), L.N. Marincovich on the Naticidae (1973), and C.M. Nelson on the Neptunaeas (1974).

At sea, sampling was carried out with the cooperation of the U.S. Coast Guard and the scientists and crew of the U.S.C.G.C. *Burton Island* under the direction of Arthur Grantz.

Frank Bernard of the Pacific Biological Station, Canada, and Andrew Carey, Oregon State University, provided valuable suggestions. George and Nettie MacGinitie were kind enough to provide copies of their works on the arctic biology. Warren Addicott of the U.S. Geological Survey gave guidance in the initial part of the study and was available throughout to aid in the identification of the arctic species.

From the beginning of the study Peter Barnes, Erk Reimnitz, Robert Rowland, and Dave Hopkins of the U.S. Geological Survey provided valuable guidance, discussion, and funding; to them my express thanks.

STUDY AREA

The Chukchi Sea is a small (580,000 km²), shallow (25 to 55 m) sea lying between the Arctic Ocean and the Bering Strait, extending from near Wrangell Island (long 180°) to Point Barrow (long 156° W). and generally bounded on the north by the 200-m isobath, which lies from 485 km (near Cape Lisburne) to about 50 km offshore (near Point Barrow) (Ingham and Rutland, 1970). The area studied (Fig.1) extends from the Bering Strait to 72°30' north latitude and is bounded on the west by the United States-Russia Convention line of 1867, and on the east by Point Barrow, Alaska.

The floor of the Chukchi Sea is a flat, almost featureless plain with depths averaging 45 to 55 m and regional gradients of 2 minutes or less (Creger and McManus, 1966). Sediment distribution is patchy as shown by figure 2. The biota that show a preference for a particular sediment type are similarly distributed.

Fig. 1. Bathymetric map of the study area in eastern Chukchi Sea.
(Compiled by L.J.Toimil and S.L.Wallace, U.S.G.S.)

Fig. 2. Texture of bottom sediments expressed in terms of three-end-member relationship of Shepard (1954).
(From Creager and McManus, 1967)

The grounding of sea ice is a common occurrence in the arctic coastal waters, and the shallowness of the Chukchi Sea makes much of the sea floor susceptible to ice gouging. Ice forms in the early fall and covers the Chukchi Sea for 7 to 8 months of the year until late spring. Shorefast ice freezes to about 2 meters and causes the littoral zone to be almost devoid of life. Some floating ice in the Chukchi Sea has keels of sufficient depth to gouge the sea floor in water as deep as 75 m (maximum), and high-density (>100 gouges per km) ice gouging extends into water as deep as 30 m (Reimnitz and others, 1972, Toimil and Grantz, 1976). Study of side-scan sonar records shows that ice gouges as much as 1.5 m deep are common (Toimil and Grantz, 1976).

Ice gouging causes major disruptions in the benthic communities by crushing the organisms and by mixing and plowing the sediments, often causing fossil material to be mixed with the living biota. Mollusks from areas of high ice-gouge densities occasionally had shells that had been cracked and later healed, possibly indicating damage caused by the ice gouging.

METHODS OF STUDY

The sampling procedure consisted of lowering a 0.1-m² van Veen sampler until sufficient material was collected for analysis. The sampling was qualitative rather than quantitative because the ability of the van Veen sampler is greatly affected by the size of the substrate material. In fine material a full grab can be taken, but in coarse or rocky substrate only a small amount of material can be recovered.

After removal of a small, raw sample for size analysis, the remaining sediment was washed through a 2-mm screen into a holding tank. The fine sediment was saved for microfaunal analysis; the coarser sediment and biota on the screen were bagged. Initially the samples were stored on board the ship in 10% neutralized formalin; later they were put into refrigerated storage at the U.S. Geological Survey in Menlo Park, Calif. The shelled organisms were fairly well preserved, but the unshelled organisms did not survive the long storage period prior to the analysis of the samples. As a result, the mollusks form the basic data for this report; data on the more durable unshelled biota are included.

The benthic faunal work was begun in the summer of 1975. Biologic material was separated from the coarse splits and sorted according to taxa. Organisms were identified by consulting the available literature on the arctic species and by contacting specialists when necessary (see acknowledgments). Species occurrences were counted for each sample, and the data were tabulated, put on computer cards, and run through a Q-mode factor analysis to determine statistical benthic communities.

It should be noted that the sampling procedure missed many occurrences of the deep-burrowing species, such as *Mya*, and the nearshore species, and the storage procedure lost many of the soft-bodied organisms, especially the annelids.

Q-MODE FACTOR ANALYSIS

Klovan and Imbrie (1971) published a Q-mode factor analysis program (CABFAC) in which as many as 1500 items (samples) can be compared with as many as 50 variables (species). The user can control the number of variables (columns) and items (rows) in the data matrix, the stopping criteria, the number of factors to be rotated in the varimax rotation (maximum of 10), and format the software input and output. The CABFAC program is written in Fortran IV and runs on an IBM 360/50 computer. James V. Gardner of the U.S. Geological Survey modified the program to accommodate 60 variables, and so it can run on the computer at the U.S. Geological Survey in Menlo Park.

Original raw data from the samples were converted so that each species was represented as a percentage of total live occurrences in each sample, giving more weight to the rarely occurring types. In the analysis these percentages are converted to vectors that can then be rotated in multi-dimensional space in order to find clusters of species occurrences. The Q-mode analysis groups samples by the species they have in common; this grouping is valuable for the recognition of faunal areas or biofacies.

Table I shows the results of the analysis as applied to the Chukchi Sea data. Forty species were compared from 101 samples. Rare species were eliminated from the matrix, as were samples with only a few organisms, in order to shorten the running time of the program. The Roman numerals indicate the computer-derived factor and the related species. The numbers following the taxa names relates to the abundance of the species in the factor. A brief description of the average substrate type for each factor is also included for reference.

Future studies will add depth, temperature, salinity, and other parameters to the matrix, and the present groupings may be altered.

Table I

Q-MODE COMMUNITIES

I	<i>Nucula tenuis</i>	6.2	Soft silty clay to pebbly clay
	<i>Macoma moesta</i>	.76	
	<i>Macoma calcaria</i>	.28	
	<i>Yoldia scissurata</i>	.21	
	<i>Solariella obscura</i>	.27	
	<i>Leda minuta</i>	.27	
	<i>Cyclocardia crassidens</i>	.18	
	<i>Hemithyris psittacea</i>	.14	
II	<i>Balanus crenatus</i>	6.1	Sandy to pebbly
	<i>Hiatella arctica</i>	1.5	
	<i>Clinocardium ciliatum</i>	.47	
	<i>Gomphina fluctuosa</i>	.36	
	<i>Macoma calcaria</i>	.23	
	<i>Boreotrophon truncatus</i>	.45	
	<i>Hemithyris psittacea</i>	.37	
	<i>Leda minuta</i>	.28	
III	<i>Serripes groenlandicus</i>	.29	Soft silty clay
	<i>Macoma calcaria</i>	6.2	
	<i>Yoldia myalis</i>	.64	
	<i>Tachyrhynchus erosus</i>	.53	
	<i>Natica clausa</i>	.44	
	<i>Clinocardium ciliatum</i>	.23	
	<i>Cyclocardia crebricostata</i>	.28	
IV	<i>Leda radiata</i>	6.2	Soft silty clay
	<i>Leda minuta</i>	1.1	
	<i>Solariella obscura</i>	.51	
V	<i>Astarte montagui</i>	6.1	Coarse sand and pebbles
	<i>Astarte borealis</i>	.64	
	<i>Azinopsida orbiculata</i>	.78	
	<i>Cyclocardia crassidens</i>	.63	
	<i>Chlamys pseudislandica</i>	.81	
	<i>Echinaraohmus parma</i>	.32	
VI	<i>Cyclocardia crassidens</i>	.96	Coarse sand and pebbles
	<i>Hiatella arctica</i>	1.5	
	<i>Balanus rostratus</i>	5.3	
	<i>Hemithyris psittacea</i>	2.4	
	<i>Astarte bennettii</i>	.49	
	<i>Chlamys pseudislandica</i>	.60	
	<i>Cyclocardia crebricostata</i>	.43	
	<i>Tachyrhynchus reticulatum</i>	.49	
VII	<i>Macoma moesta</i>	6.0	Sandy silty clay
	<i>Clinocardium ciliatum</i>	1.2	
	<i>Yoldia amygdalea</i>	.96	
	<i>Yoldia myalis</i>	.44	
	<i>Echinaraohmus parma</i>	.49	

VIII	<i>Astarte borealis</i>	3.6	Sandy silty clay with cobbles, pebbles
	<i>Yoldia myalis</i>	3.5	
	<i>Hemithyrus psittacea</i>	1.5	
	<i>Tachyrynchus reticulatum</i>	1.4	
	<i>Cyclocardia crassidens</i>	1.3	
	<i>Leda minuta</i>	1.3	
	<i>Boreotrophon truncatus</i>	1.2	
	<i>Yoldia scissuratus</i>	1.0	
	<i>Margarites costalis</i>	1.0	
	<i>Natica clausa</i>	.8	
	<i>Hiatella arctica</i>	.6	
	<i>Astarte bennettii</i>	.5	
	<i>Gomphina fluctuosa</i>	.5	
	<i>Tachyrhynchus erosus</i>	.5	

The recurrent groups of species listed above do not compare well with the communities proposed by Thorson (1957). Thorson's communities are both statistical and ecological units, whereas the above groups are purely statistical. The character of the substrate seems to be the most important factor controlling the distribution of species in the Chukchi Sea. The epifaunal species like *Hemithyrus psittacea* (a brachiopod) and *Balanus* sp. can only occur where the substrate includes something to which they can attach themselves. Several of the Q-mode groups interfinger depending on relative abundance of the preferred substrate of each group; for instance communities II and III are similar to Thorson's *Macoma calcaria* community, in which an increase in silt will increase the number of *Macoma calcaria* and an increase in sand will increase the numbers of *Clinocardium ciliatum* and *Serripes groenlandicus*. In areas of high ice-gouge density the faunas are disturbed and do not fit well into any faunal group.

SPECIES LIST

A species list of benthic infaunal and epifaunal organisms is being compiled for the eastern Chukchi Sea. The list currently consists only of specimens collected during the August 1974 cruise of the U.S. Coast Guard Cutter *Burton Island*.

BRACHIOPODA

Taxon Name	PAGE
<i>Hemithyris psittacea</i> (Gmelin, 1792)	15

CIRRIPEDIA

<i>Balanus orenatus</i> Brugiere, 1789	16
<i>Balanus rostratus alaskensis</i> Pilsbry, 1916	17

FORAMINIFERA

Elphidiella sibiricum

POLYCHETA

<i>Pectinaria californiensis</i> Hartman	18
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ECHINODERMATA

Taxon Name	
Asteroidea	
<i>Asterias amurensis</i> Lutkin 1886	
Clypeasteroidea	
<i>Echinaraohmus paxma</i> (Lamarck, 1818)	19
Echinoidea	
<i>Strongylocentrotus droebachiensis</i> (Muller, 1852)	20
Holothuroidea	
<i>Psolus phantapus</i> (Strussenfeldt)	21
<i>Psolus fabricii</i> (Duben and Koren)	22
<i>Myriotrochus rinkii</i> (Danielssen and Koran, 1887)	

GASTROPODA

Taxon Name	PAGE
<i>Admete couthouyi</i> (Jay, 1839)	23
<i>Admete middendorffiana</i> (Dall, 1885)	24
<i>Acmaea testudinalis</i> (Muller, 1776)	25
<i>Beringius beringi</i> (Middendorff, 1849)	26
<i>Boreotrophon clathratus</i> (Linne, 1767)	27
<i>Boreotrophon clathratus</i> var. <i>gomeri</i> (Loven, 1846)	28
<i>Boreotrophon pacificus</i> (Dall, 1902)	29
<i>Boreotrophon truncatus</i> (Strøm, 1768)	30
<i>Buccinum ciliatum</i> Fabricius, 1780	31
<i>Buccinum glaciale</i> Linne, 1761	32
<i>Buccinum polare</i> Gray, 1839	33
<i>Buccinum tenue</i> Gray, 1839	34
<i>Buccinum undatum</i> (Linnaeus, 1761)	35
<i>Crepidula grandis</i> Middendorff, 1849	36
<i>Cylichna alba</i> (Brown, 1827)	37
<i>Cylichna occulta</i> (Mighels, 1841)	38
<i>Epitonium greenlandicum</i> (Perry, 1811)	39
<i>Lepeta caeca</i> (Müller, 1776)	40
<i>Margarites costalis</i> (Gould, 1841)	41
<i>Margarites frigidus</i> Dall, 1919	42
<i>Margarites striatus</i> (Broderip and Sowerby, 1817)	43
<i>Margaritopsis pribiloffensis</i> (Dall, 1919)	44

GASTROPODA

Taxon Name

PAGE

<i>Natica olausa</i> Broderip and Sowerby, 1829	45
<i>Neptunea middendorffiana</i> MacGinitie, 1959	
<i>Neptunea satura heros</i> (Gray, 1850)	46
<i>Nodotoma impressa</i> (Mörch, 1869)	47
<i>Oenopota elegans</i> (Möller, 1842)	48
<i>Oenopota tenuioostata</i> (G.O.Sars, 1878)	49
<i>Piliscus commodus</i> (Middendorff, 1851)	50
<i>Plicifusus kroyeri</i> (Möller, 1842)	51
<i>Polinices pallidus</i> (Broderip and Sowerby, 1829)	52
<i>Ptychatractus occidentalis</i> Stearns, 1871	53
<i>Puncturella noachina</i> (Linnaeus, 1771)	54
<i>Solariella obscura</i> (Couthouy, 1838)	55
<i>Tachyrynchus erosus</i> (Couthouy, 1838)	56
<i>Tachyrynchus reticulatum</i> (Mighels and Adams, 1842)	57
<i>Trichotropis kroyeri</i> Philippi, 1849	58

CEPHALOPODA

Octopodidae

Octopus sp.

AMPHINEURA

Ischnoohiton albus (Linnaeus, 1767)

PELECYPODA

Taxon Name	PAGE
<i>Astarte bennettii</i> Dall 1903	59
<i>Astarte borealis</i> (Schumacher, 1817)	60
<i>Astarte montagui</i> (Dillwyn, 1817)	61
<i>Asthenothaerus adamsi</i> (MacGinitie, 1959)	62
<i>Axinopsida orbiculata</i> (G.O.Sars, 1878)	63
<i>Chlamys pseudislandica</i> MacNeill, 1967	64
<i>Clinocardium californiense</i> (Deshayes, 1839)	65
<i>Clinocardium ciliatum</i> (Fabricius, 1780)	65
<i>Cyclocardia crassidens</i> (Broderip and Sowerby, 1829)	67
<i>Cyclocardia crebricostata</i> (Krause, 1895)	68
<i>Gomphina fluctuosa</i> (Gould, 1841)	69
<i>Hiatella arctica</i> (Linne', 1767)	70
<i>Leda minuta</i> (Fabricius, 1776)	71
<i>Leda permula</i> (Muller, 1779)	72
<i>Leda radiata</i> (Krause, 1885)	73
<i>Lyonsia arenosa</i> Gould, 1861	74
<i>Macoma brota</i> Dall, 1916	75
<i>Macoma caloarea</i> (Gmelin, 1791)	76
<i>Macoma lipara</i> Dall, 1916	
<i>Macoma moesta</i> (Deshayes, 1855)	77
<i>Macoma obliqua</i> (Sowerby and Broderip, 1817)	78
<i>Montacuta planata</i> (Dall, 1885)	79

PELECYPODA

Taxon Name	PAGE
<i>Musculus oregatus</i> (Stimpson, 1851)	80
<i>Musculus discors</i> (Linnaeus, 1767)	80
<i>Musculus niger</i> (Gray, 1824)	80
<i>Mya elegans</i> (Eichwald, 1871)	81
<i>Mya pseudoarenaria</i> Schlessch, 1931	82
<i>Mya truncata</i> Linne, 1758	
<i>Nucula tenuis</i> (Montagu, 1808)	83
<i>Pandora glacialis</i> Leach, 1819	84
<i>Panomya arctica</i> (Lamarck, 1818)	85
<i>Periploma alaskanum</i> William, 1940	86
<i>Pseudopythina compressa</i> Dall, 1899	87
<i>Serripes groenlandicus</i> (Bruguire, 1789)	88
<i>Tellina lutea</i> Broderip and Sowerby, 1829	89
<i>Thracia myopsis</i> (Möller, 1842)	90
<i>Yoldia amygdalea</i> Valenciennes, 1846	91
<i>Yoldia hyperborea</i> Torrell	
<i>Yoldia myalis</i> (Couthouy, 1838)	92
<i>Yoldia scissurata</i> Dall, 1897	93

SPECIES DISTRIBUTION PATTERNS

A series of range maps (p.14-93) and distribution listings (table II) have been compiled to demonstrate the distributional patterns of the benthic organisms in the eastern Chukchi Sea. All samples were collected using a 0.1 m² van Veen sampler on the August 1974 cruise of the U.S.Coast Guard Cutter BURTON ISLAND. For clarity only the van Veen samples are shown on the sample location map (Fig. 3). Solid circles on the range maps represent live occurrences, open circles represent where only empty shells were found.

Hemithyrus psittaoea (Gmelin, 1792)

Balanus aeneus Brugiere, 1789

Balanus rostratus alaskensis Pilsbry, 1916

Pectinaria californiensis Hartman

Echinarachnius parma (Lamarck)

Strongylocentrotus drobachiensis (Müller)

Peolus phantopus (Strussenfeldt)

Paolus fabrioi (Duben and Koren)

Admete outhouyi (Jay, 1839)

Admete middendorffiana (Dall, 1885)

Amasa testudinalis (Muller, 1776)

Beringius beringi (Middendorff, 1849)

Boreotrophon olathratus (Linne, 1767)

Boreotrochan olathratus var. *gomeri* (Lovén, 1846)

Boreotrophon pacificus (Dall, 1902)

Boreotrophon truncatus (Ström, 1768)

Buccinum ciliatum Fabricius, 1780

Buccinum glaciale Linne, 1761

Crepidula grandis Middendorff, 1849

Cyliothma occulta (Mighels, 1841)

Epitonium greenlandicum (Perry, 1811)

Lepeta caeca (Müller, 1776)

Margarites frigidus Dall, 1919

Margarites striatus (Broderip and Sowerby, 1817)

Margaritopsis pribiloffensis (Dall, 1919)

Natia olausa Broderip and Sowerby, 1829

Neptunea satura heros (Gray, 1850)

Modotoma impressa (Mörch, 1869)

Oenopota elegans (Möller, 1842)

Oenopota tenuicostata (G.O.Sars, 1878)

Piliscus commodus (Middendorff, 1851)

Plicifusus kroyeri (Möller, 1842)

Polinices pallidus (Broderip and Sowerby, 1829)

Ptychatractus occidentalis Stearns, 1871

Puncturella noachina (Linnaeus, 1771)

Solariella obscura (Couthouy, 1838)

Tachyrynchus erosus (Couthouy, 1838)

Tachyrrhynchus reticulatum (Mighels and Adams, 1842)

Trichotropis kroyeri Philippi, 1849

Astarte montagui (Dillwyn, 1817)

Asthenotharus adamsi (MacGinitie, 1959)

Azinopsida orbiculata (G.O.Sars, 1878)

Chlamys pseudislandica MacNeill, 1967

Clinocardium californiense (Deshayes, 1839)

Clinocardium oiliatum (Fabricius, 1780)

Cyclocardia crassidens (Broderip and Sowerby, 1829)

Cyclooecardia orebricostata (Krause, 1895)

Gomphina fluctuosa (Gould, 1841)

Hiatella arctica (Linne', 1767)

Leda minuta (Fabricius, 1776)

Leda permula (Müller, 1779)

Leda radiata (Krause, 1885)

Lyonsia arenosa Gould, 1861

Macoma moesta (Deshayes, 1855)

Macoma obliqua (Sowerby, 1817)

Montacuta planata (Dall, 1885)

Musculus corregatus (Stimpson, 1851) ●

Musculus discors (Linnaeus, 1767) ■

Musculus niger (Gray, 1824) ▲

Mya elegans (Eichwald, 1871)

Nya pseudoarenaria Schlesch, 1931

Moulia tenuis (Montagu, 1808)

Pandora glacialis Leach, 1819

Pseudopythina compressa Dall, 1899

Serripes groenlandicus (Bruguère, 1789)

Tellina lutea Broderip and Sowerby, 1829

Thracia myopsis (Møller, 1842)

Yoldia amygdalea Valenciennes, 1846

Ioldia myalis (Couthouy, 1838)

Yoldia scissurata Dall, 1897

Table 2 Locality Listing

With each species name is a listing of the localities at which that species was collected. Localities preceding the bracket are those at which the species was collected alive, those following the bracket yielded only empty shells.

All localities are U.S. Geological Survey Menlo Park register paleontology numbers, 6000 series. For example 744 is USGS-M-6774.

BRACHIOPODA

Hemithiris psittacea 742, 746, 747, 756, 757, 760, 762, 763, 766, 782, 784, 829) 754, 761, 768, 774, 780, 785, 805, 806.

CIRRIPEDIA

Balanus crenatus 742, 744, 746, 747, 753, 756, 757, 758, 762, 763, 764, 765, 773, 774, 776, 779, 780, 783, 784, 789, 844.

Balanus rostratus alaskensis 742, 744, 746, 747, 749, 756, 758, 760, 762, 768, 781, 782, 785, 804.

FORAMINIFERA

Elphidiella sibiricum 750

POLYCHAETA

Pectinaria californiense 752, 754, 756, 758, 760, 761, 762, 765, 783, 792, 794, 795, 796, 798, 799, 806, 817, 819, 820, 823, 827, 828, 832, 833, 840, 842, 843.

ECHINODERMATA

Asterias amurensis 801

Echinarachnius parma 748, 749, 750, 761, 807) 751, 791.

Psolus fabricii 747, 759, 760.

Psolus phantopus 774, 782, 805, 840.

Strongylocentrotus droebachiensis 764.

AMPHINEURA

Ischnochiton albus 756, 764, 765, 782, 805.

CEPHALOPODA

Ootopus sp. 804

GASTROPODA

<i>Admete couthouyi</i>	744, 757, 833) 804
<i>Admete middendorffiana</i>	755, 839.
<i>Amaea testudinalis</i>	829)
<i>Beringius beringi</i>	)819, 833.
<i>Boreotrophon clathratus</i>	742, 748, 757) 768, 779.
<i>Boreotrophon clathratus</i> var. <i>gomeri</i>	744, 784.
<i>Boreotrophon trunctus</i>	745, 746, 747, 760, 761, 762, 764, 765, 774, 777, 779, 780, 782, 808) 773.
<i>Boreotrophon pacificus</i>	758.
<i>Buccinum oiliatum</i>	752.
<i>Buccinum glaciale</i>	744, 795, 804) 746
<i>Buccinum polare</i>	746, 761, 775, 822, 831, 836) 772, 796.
<i>Buccinum tenue</i>	749, 808.
<i>Buccinum undatum</i>	745, 765, 776, 780) 746, 774, 778, 779, 806, 811.
<i>Crepidula grandis</i>	760, 764.
<i>Cylichna alba</i>	755, 761, 765, 776, 795, 813, 817, 820, 821, 823, 834, 837) 811, 812, 816.
<i>Cylichna oculata</i>	750, 770, 824, 830.
<i>Epitonium greenlandicum</i>	759, 760.
<i>Lepeta caeca</i>	745, 804, 829, 832.
<i>Margarites costalis</i>	744, 745, 746, 754, 757, 760, 761, 762, 780, 781, 788, 807, 817, 818, 819) 773, 778.
<i>Margarites frigidus</i>	809.
<i>Margarites striatus</i>	777
<i>Margarites pribiloffensis</i>	749, 752.
<i>Natica clausa</i>	742, 744, 745, 746, 748, 749, 760, 762, 763, 766, 768, 769, 775, 779, 780, 783, 798, 799, 805, 806, 811, 813, 815, 817, 828, 831, 842, 843) 773, 774, 792, 793, 794, 796, 797, 800, 814, 832, 839.
<i>Neptunea middendorffiana</i>	744, 748, 760, 761, 819.
<i>Neptunea satura heros</i>	839.
<i>Nodotoma impressa</i>	804, 806.
<i>Oenopota elegans</i>	748, 749, 832.
<i>Oenopota tenuicostata</i>	744, 754, 757, 763, 782, 784, 785.
<i>Piliscus commodus</i>	745, 746.
<i>Plifuscus kroyeri</i>	755, 784) 813.
<i>Polinices pallidus</i>	752, 799, 806, 809, 815) 828.
<i>Ptychotractus occidentalis</i>	820
<i>Solariella obscura</i>	744, 745, 748, 749, 750, 753, 754, 755, 756, 784, 787, 789, 795, 796, 797, 803, 807, 811, 822, 823, 824, 825, 834, 841) 775, 776, 778, 791, 808, 840.
<i>Tachyrynchus erosus</i>	744, 745, 748, 750, 752, 754, 755, 756, 771, 788, 789, 795, 797, 809, 810, 812, 837, 841) 749, 767, 772, 828, 836, 838.
<i>Tachyrynchus reticulatum</i>	744, 745, 746, 747, 755, 756, 761, 762, 776) 782, 790, 806, 829.
<i>Triachotropis kroyeri</i>	767, 768, 772, 779, 806, 811, 822.

PELECYPODA

<i>Astarte bennettii</i>	745, 747, 749, 755, 756, 758, 760, 761, 762, 765, 781, 788, 804, 805) 746, 784, 758.
<i>Astarte borealis</i>	746, 752, 755, 763, 767, 785, 805, 809, 815, 816, 819, 828, 830) 744, 753, 754, 761, 762, 765, 766, 768, 769, 772, 773, 782, 784, 795, 806, 808, 810, 813, 818, 824, 833, 837, 839.
<i>Astarte montagui</i>	742, 744, 745, 746, 748, 749, 752, 761, 763, 764, 765, 766, 773, 774, 780, 782, 804, 806, 807, 808, 810, 817, 719, 822, 826, 829, 831, 832, 834, 835, 839, 840) 757, 758, 759, 760, 762, 768, 788, 803, 818.
<i>Asthenothargus^e adamsi</i>	748, 749, 764.
<i>Axinopsida orbiculata</i>	775, 776, 778, 780, 784, 785, 788, 791, 804, 806, 814, 819, 827, 843) 808.
<i>Chlamys pseudislandica</i>	) 746, 747, 757, 759, 760, 762, 764, 765, 780, 781, 783, 784, 804.
<i>Clinocardium californiense</i>	745, 760) 763, 780, 781, 787, 789.
<i>Clinocardium ciliatum</i>	747, 754, 770, 790) 744, 746, 778, 779, 784, 786, 842.
<i>Cyclocardia crassidens</i>	744, 745, 746, 748, 754, 757, 761, 762, 764, 765, 780, 782, 784, 804, 805, 806, 815, 817, 834) 766, 767, 773, 779, 785, 812.
<i>Cyclocardia crebricostata</i>	745, 750, 751, 760, 768, 781) 749.
<i>Gomphina fluctuosa</i>	745, 746, 748, 750, 752, 753, 755, 756, 757, 760, 763, 764, 768, 769, 787, 804, 807, 809, 815, 821, 822, 823, 824, 825, 826, 828, 840) 747, 765, 767, 772, 775, 780, 785, 795, 802, 805, 806, 808, 819, 832.
<i>Hiatella arctica</i>	742, 744, 745, 746, 747, 748, 751, 756, 757, 758, 759, 760, 762, 764, 765, 779, 780, 784) 743, 761, 763, 781, 782, 785, 834.
<i>Leda minuta</i>	744, 745, 746, 747, 755, 756, 784, 790, 805, 809, 813) 765, 778, 780, 783, 811, 818, 822, 828, 839.
<i>Leda permula</i>	810, 837.
<i>Leda radiata</i>	742, 769, 778, 787, 789, 790, 797, 799, 805, 809, 811, 813, 817, 826, 827, 837, 838, 839, 844) 765, 767, 776, 796, 803, 808, 812, 814, 815, 816, 819.
<i>Lyonsia arenosa</i>	760, 820, 824, 833) 809.
<i>Macoma brota</i>	) 772, 793.
<i>Macoma calcaria</i>	742, 743, 745, 746, 750, 754, 758, 761, 764, 766, 767, 768, 772, 783, 784, 785, 789, 790, 791, 795, 796, 800, 804, 805, 806, 808, 809, 810, 811, 812, 814, 816, 817, 820, 822, 823, 826, 827, 833, 835) 744, 769, 770, 771, 776, 778, 788, 792, 793, 794, 797, 798, 799, 801, 802, 803, 821, 829, 831, 834, 837, 838, 840, 841, 842, 843, 844.

<i>Macoma moesta</i>	746, 749, 751, 752, 755, 756, 776, 783, 786, 790, 794, 796, 797, 799, 800, 805, 806, 807, 810, 811, 813, 814, 815, 816, 818, 820, 821, 823, 824, 826, 828, 831, 833, 842, 843) 778, 819.
<i>Macoma obliqua</i>	833.
<i>Montacuta planata</i>	762, 785, 815, 824.
<i>Musculus corregatus</i>	760, 762.
<i>Musculus discors</i>	832.
<i>Musculus niger</i>	822, 824, 833) 821
<i>Mya elegans</i>	)749, 784.
<i>Mya pseudoarenaria</i>	744, 749, 760, 765, 825, 826, 843) 748, 757, 784, 807, 824
<i>Mya truncata</i>	743, 746, 760) 749, 843.
<i>Nucula tenuis</i>	743, 745, 751, 752, 754, 756, 757, 761, 762, 766, 767, 768, 769, 771, 772, 773, 775, 776, 777, 778, 782, 783, 784, 788, 789, 790, 791, 793, 794, 795, 796, 797, 798, 799, 800, 801, 804, 805, 806, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 820, 821, 823, 824, 825, 826, 827, 828, 831, 832, 833, 834, 835, 836, 837, 839, 840, 841, 842, 843, 844) 792, 802, 803, 819.
<i>Pandora glacialis</i>	748, 804, 824) 762, 780.
<i>Panomya arctica</i>	746, 760.
<i>Periploma</i> sp.	768, 802, 809, 820, 834), 810, 812, 838.
<i>Pseudopythina compressa</i>	743) 771, 780.
<i>Serripes groenlandicus</i>	744, 751, 752, 755, 764, 789, 790) 745, 749, 753, 758, 760, 763, 780, 784, 791, 794, 798, 799, 804, 816.
<i>Tellina lutea</i>	)788.
<i>Thracia myopsis</i>	800, 829) 788.
<i>Yoldia amygdalea</i>	743, 769, 770, 783, 796, 811, 813, 815, 816, 817, 818, 819, 826, 833, 834, 843.
<i>Yoldia hyperborea</i>	828.
<i>Yoldia myalis</i>	742, 745, 746, 748, 749, 752, 756, 757, 758, 761, 763, 764, 765, 781, 784, 799, 809, 812, 820, 822, 828, 830) 744, 755, 780, 805, 815, 816, 821.
<i>Yoldia scissurata</i>	743, 750, 751, 752, 758, 761, 772.

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APPENDIX A

LOCALITY DATA

M 6742 Alaska, Chukchi Sea, Recent Van 'Veen Grab Sample
U.S. Coast Guard Icebreaker "Burton Island"
Chief Scientist - Arthur Grantz, Summer 1974

	Latitude: 71°23.9'	Longitude: 156°50.9'
	Depth: 85 m	Sediment type: gravelly mud
	Field number: BI74-001	Date: 8/5/74
M6743	as 6742	
	Latitude: 71°23.8'	Longitude 156°49.1'
	Depth: 100 m	Sediment type: sand w/pea gravel
	Field number: BI74002	Date: 8/6/74
M6744	as 6742	
	Latitude: 71°03.6'	Longitude: 157°37.3'
	Depth: 31 m	Sediment type: Pebbly mud
	Field number: BI74-005	Date: 8/6/74
M6745	as 6742	
	Latitude: 71°03.4'	Longitude: 158°018'
	Depth: 31 m	Sediment type:
	Field number BI74-006	Date: 8/6/74
M6746	as 6742	
	Latitude 71°01.8'	Longitude 158°55'
	Depth: 36 m	Sediment type: sand and cobbles
	Field number BI74-010	Date: 8/6/74
M6747	as 6742	
	Latitude: 70°51.4	Longitude 159°41.4'
	Depth: 30 m	Sediment type: boulders
	Field Number: BI74-012	Date: 8/6/74
M6748	as 6742	
	Latitude 70°40.8'	Longitude 160°38.76'
	Depth: 27 m	Sediment type: silty sand
	Field Number: BI74-014	Date: 8/7/74
M6749	as 6742	
	Latitude 70°36.4'	Longitude 162°03.
	Depth 36 m	Sediment type: silty sand
	Field Number: BI74-018	Date: 8/7/74
M6750	as 6742	
	Latitude 70°26.9'	Longitude 162°45.9'
	Depth: 32 m	Sediment type: clean sand
	Field number: BI74-019	Date: 8/7/74
M6751	as 6742	
	Latitude 70°08.1'	Longitude 163°52.4'
	Depth: 27 m	Sediment type: clayey sand/gravel
	Field Number: BI74-021	Date: 8/7/74

M6752 as 6742	Latitude: 69°48.63'	Longitude 164°15.13'
	Depth 24 m	Sediment type:
	Field number: BI74-024	Date: 8/7/74
M6753 as 6742	Latitude: 70°25.9'	Longitude 163°49.1'
	Depth: 30 m	Sediment type sandy clay
	Field number BI74-025	Date: 8/8/74
M6754 as 6742	Latitude: 70°43.4'	Longitude 163°41.7'
	Depth: 45 m	Sediment type: silt/clay
	Field Number: BI74-026	Date: 8/8/74
M6755 as 6742	Latitude: 70°39.1'	Longitude 162°42.5'
	Depth: 40 m	Sediment type: silty clay
	Field number: BI74-025	Date: 8/8/74
M6756 as 6742	Latitude: 70°45.6'	Longitude 161°12.4'
	Depth: 40 m	Sediment type: pebbles - silty sand
	Field number: BI74-033	Date: 8/8/74
M6757 as 6742	Latitude 70°53.4'	Longitude 160°35.25'
	Depth: 47 m	Sediment type: silty clay - pebbles
	Field number: BI74-036	Date: 8/8/75
M6758 as 6742	Latitude 70°43.2'	Longitude 159°59.91'
	Depth: 20 m	Sediment type: gravel, sand
	Field number: BI74-037	Date: 8/8/74
M6759 as 6742	Latitude: 70°52.13'	Longitude 159°57.32'
	Depth 45 m	Sediment type: gravelly sand
	Field number: BI74-039	Date: 8/8/74
M6760 as 6742	Latitude 70°58.7'	Longitude 159°13.3'
	Depth: 42 m	Sediment type: silty sand - clay subsurface
	Field number: BI74-041	Date: 8/8/74
MB6761 as 6742	Latitude: 71°03.1'	Longitude 158°27.2'
	Depth 30 m	Sediment type: silty sand - pebbles
	Field number: BI74-045	Date: 8/9/74
M6762 as 6742	Latitude: 71°09.4'	Longitude: 57°48.0'
	Depth: 44 m	Sediment type: pebbly, silty sand
	Field number: BI74-047	Date: 8/9/74

M6763 as 6742	Latitude: 71°15.1'	Longitude 157°12.4'
Depth: 45 m	Field number: BI74-049	Sediment type: gravelly sand
		Date: 8/9/74
M6764 as 6742	Latitude: 70°58.8'	Longitude 159°54.4'
Depth: 61 m	Field number: BI74-075	Sediment type: cobbles, gravelly,
		Date: 8/12/74 silty sand
M6765 as 6742	Latitude 70°56.8	Longitude 160°59'
Depth: 49 m	Field number: BI74-077	Sediment type: silty sand -
		Date: 8/12/74 gravelly rocks
M6766 as 6742	Latitude: 70°58.1	Longitude: 161°59.7'
Depth: 45 m	Field number: BI74-080	Sediment type: silty sand - pebbles
		Date: 8/12/74
M6767 as 6742	Latitude 71°00.1'	Longitude 163°02.7'
Depth: 46 m	Field number: BI74-082	Sediment type: surface pebbly sands
		Date: 8/12/74 silty clay substructure
M6768 as 6742	Latitude 70°49.6'	Longitude: 163°56.7'
Depth: 44 m	Field number: BI74-083	Sediment type: sandy clay with gravel
		Date: 8/12/74
M6769 as 6742	Latitude: 70°47.6'	Longitude: 164°09.2'
Depth: 42 m	Field number: BI74-084	Sediment type: silty clay
		Date: 8/12/74
M6770 as 6742	Latitude: 70°18.8'	Longitude: 164°58.5'
Depth: 52 m	Field number: BI74-085	Sediment type: sandy-silty clay
		Date: 8/13/74
M6771 as 6742	Latitude: 70°0.1'	Longitude: 164°54.6'
Depth: 35 m	Field number: BI74-086	Sediment type: sandy, silty clay
		Date: 8/13/74
M6772 as 6742	Latitude: 69°37.0'	Longitude: 165°02.0'
Depth: 45 m	Field number: 088	Sediment type: silty sand/clay
		Date: 8/13/74
M6773 as 6742	Latitude: 69°17.1'	Longitude: 164°59.9'
Depth: 32 m	Field number: BI74-090	Sediment type: fine sandy silt
		Date: 8/13/74

M6774 as 6742	Latitude: 69°05.3'	Longitude 164°59.0'
	Depth: 25 m	Sediment type: gravel
	Field number: BI74-091	Date: 8/13/74
M6775 as 6742	Latitude 69°16.2'	Longitude 165°52.3'
	Depth: 35 m	Sediment type: silty sand
	Field number: BI74-099	Date: 8/13/74
M6776 as 6742	Latitude: 69°27.6'	Longitude 166°40.5'
	Depth: 43 m	Sediment type: sandy silt
	Field number: BI74-100	Date: 8/13/74
M6777 as 6742	Latitude 69°10.0'	Longitude 167°13.6'
	Depth: 60 m	Sediment type: sandy silt
	Field number: BI74-107	Date: 8/14/74
M6778 as 6742	Latitude: 68°51.8'	Longitude 166°51.1'
	Depth 39 m	Sediment type: silty clay
	Field number: BI74-108	Date: 8/14/74
M6779 as 6742	Latitude: 68°31.6'	Longitude: 166°35.2'
	Depth: 32 m	Sediment type: silty sand/gravel
	Field number: BI74-110	Date: 8/14/74
M6780 as 6742	Latitude: 68°25.2'	Longitude: 167°20.7'
	Depth: 39 m	Sediment type: gravelly sandy, silty
	Field number: BI74-113	Date: 8/15/74 clay
M6781 as 6742	Latitude: 68°14.0'	Longitude: 166°42.0'
	Depth: 30 m	Sediment type: sand-pea gravel, silt
	Field number: BI74-114	Date: 8/14/74
M6782 as 6742	Latitude: 68°14'	Longitude: 166°42'
	Depth: 36 m	Sediment type: gravelly sand
	Field number: BI74-115	Date: 8/14/74
M6783 as 6742	Latitude: 67°51.5'	Longitude: 166°59.1'
	Depth: 59 m	Sediment type: sandy clay
	Field number: BI74-116	Date: 8/15/74
M6784 as 6742	Latitude: 67°54'	Longitude: 166°16'
	Depth: 38 m	Sediment type: gravelly, sandy silt
	Field number: BI74-117	Date: 8/15/74

M6785 as 6742	Latitude: 67°58.7'	Longitude: 165°37.8'
	Depth: 27 m	Sediment type: large pebbles on silty clay
	Field number: BI74-118	Date: 8/15/74
M6786 as 6742	Latitude: 67°29.03'	Longitude: 165°19.72'
	Depth: 36 m	Sediment type: silty clay - cobbles/
	Field number: BI74-120	Date: 8/15/74 pebbles
M6787 as 6742	Latitude: 67°04.4'	Longitude: 165°18.9'
	Depth: 23 m	Sediment type: sandy-silty clay - gravel
	Field number: BI74-121	Date: 8/15/74
M6788 as 6742	Latitude: 66°36.0'	Longitude: 165°22.10'
	Depth: 19 m	Sediment type: sand/silty clay
	Field number: BI74-122	Date: 8/15/74
M6789 as 6742	Latitude: 66°50.9'	Longitude: 164°39.5'
	Depth: 26 m	Sediment type: sandy-silty clay
	Field number: BI74-123	Date: 8/15/74
M6790 as 6742	Latitude: 67°03.5'	Longitude: 164°
	Depth: 31 m	Sediment type: silty clay
	Field number: BI74-124	Date: 8/16/74
M6791 as 6742	Latitude: 67°04.1'	Longitude: 166°11.8'
	Depth: 30 m	Sediment type: silty-sandy clay
	Field number: BI74-126	Date: 8/16/74
M6792 as 6742	Latitude: 67°20.1'	Longitude: 166°45.1'
	Depth: 44 m	Sediment type: silty clay
	Field number: BI74-127	Date: 8/16/74
M6793 as 6742	Latitude: 67°34.8'	Longitude: 167°16.0'
	Depth: 37 m	Sediment type: silty clay
	Field number: BI74-128	Date: 8/16/74
M6794 as 6742	Latitude: 67°49.2'	Longitude: 167°46.1'
	Depth: 55 m	Sediment type: silty clay
	Field number: BI74-129	Date: 8/16/74
M6795 as 6742	Latitude: 67°56.4'	Longitude: 167°50.5'
	Depth: 58 m	Sediment type: sandy-silty clay
	Field number: BI74-130	Date: 8/16/74

M6796 as 6742	Latitude: 68°00.5'	Longitude: 168°59.3'
	Depth: 55 m	Sediment type: silty sand/clay
	Field number: B174-132	Date: 8/16/74
M697 as 6742	Latitude 68°26.9'	Longitude 167°53.1'
	Depth 53 m	Sediment Type: sandy silty clay/pebbles
	Field number: B174-133	Date: 8/17/74
M6798 as 6742	Latitude 68°13.5'	Longitude 168°24.5'
	Depth 50 m	Sediment type: sandy-silty clay
	Field number: B174-134	Date: 8/17/74
M6799 as 6742	Latitude 68°20.6'	Longitude 168°52.5'
	Depth 60 m	Sediment type: silty clay
	Field number: B174/135	Date: 8/18/1974
M6800 as 6742	Latitude 68°41.1'	Longitude 168°52.8'
	Depth 60 m	Sediment type
	Field number: B174-136	Date:
M6801 as 6742	Latitude 69°01.1	Longitude 168°53.5'
	Depth 5.5 m	Sediment type silty clay
	Field number: B174-137	Date: 8/18/74
M6802 as 6742	Latitude 69°16.0'	Longitude 168°53.2'
	Depth	Sediment type: clay
	Field number: B174-138	Date: 8/18/74
M6803 as 6742	Latitude 69°32.1	Longitude 168°55.0'
	Depth	Sediment type: sandy silty clay
	Field number: B174/139	Date: 8/18/74
M6804 as 6742	Latitude 69°51.5'	Longitude 168°50.7'
	Depth 48 m	Sediment type: gravely, sandy, silty
	Field number: B174-140	Date: 8/18/74 clay
M6805 as 6742	Latitude 70°10.7'	Longitude 168°48.8'
	Depth 47 m	Sediment type: silty sandy gravel
	Field number B174-141	Date: 8/18/74
M6806 as 6742	Latitude 70°25.7	Longitude 168°47'
	Depth 45 m	Sediment type: silty sand-gravel
	Field number: B174-142	Date: 8/18/74

M6829 as 6742	Latitude 71°29.7'	Longitude 157°01.5'
	Depth 140 m	Sediment type: silty sand, pebbles
	Field number: B174-167	Date: 8/25/74
M6830 as 6742	Latitude 71°36.6'	Longitude 157°22.1
	Depth 200 m	Sediment type: silty clay/pebbles
	Field number: B174-168	Date: 8/25/74
M6831 as 6742	Latitude 71°31.7'	Longitude 157°38.8'
	Depth 82 m	Sediment type silty clay
	Field number: B174-169	Date: 8/25/74
M6832 as 6742	Latitude 71°15.4'	Longitude 159°17.4'
	Depth 71 m	Sediment type: gravely sandy silt
	Field number B174-170	Date: 8/25/74
M6833 as 6742	Latitude 71°17.2'	Longitude 160°34.5'
	Depth 49 m	Sediment type silty clay
	Field number: B174-171	Date: 8/25/74
M6834 as 6742	Latitude 71°14.3	Longitude 163°03.1'
	Depth 48 m	Sediment type: sandy silty clay
	Field number: B174-173	Date: 8/25/74
M6835 as 6742	Latitude 71°13.9'	Longitude 165°26.2'
	Depth 42 m	Sediment type: sandy silty clay
	Field number B174-174	Date: 8/25/74
M6836 as 6742	Latitude 71°14.4'	Longitude 167°00'
	Depth 48 m	Sediment type: silty clay
	Field number: B174-175	Date: 8/25/74
M6837 as 6742	Latitude 70°55'	Longitude 167°00.6'
	Depth 39 m	Sediment type: sandy silty clay
	Field number: B174-176	Date: 8/26/74
M6838 as 6742	Latitude	Longitude
	Depth 47 m	Sediment type: silty clay
	Field number: B174-177	Date: 8/26/74
M6839 as 6742	Latitude	Longitude
	Depth 46 m	Sediment type
	Field number: B174-178	Date: 8/26/74

M6818 as 6742	Latitude 71°50.3'	Longitude 164°45.2'
	Depth 40 m	Sediment type
	Field number: B174-155	Date: 8/21/74
M6819 as 6742	Latitude 71°30.5'	Longitude 164°53'
	Depth 42 m	Sediment type: sandy-silty clay
	Field number: B174-156	Date: 8/21/74
M6820 as 6742	Latitude 71°15.0'	Longitude 164°09.3'
	Depth 50 m	Sediment type: silty clay/with sand,
	Field number: B174-157	Date: 8/21/74 gravel
M6821 as 6742	Latitude 71°39.2'	Longitude 161°08.0'
	Depth 45 m	Sediment type: gravely-sandy silty clay
	Field number: B174-159	Date: 8/22/74
M6822 as 6742	Latitude	Longitude
	Depth 34 m	Sediment type: silty sand/gravel
	Field number: B174-150	Date: 8/22/74
M6823 as 6742	Latitude 72°00.4'	Longitude 161°58'
	Depth 24 m	Sediment type: silty sand
	Field number: B174-161	Date: 8/22/74
	(Edge of 'Hanna Shoal' ice island - Katy's Floeberg & other names)	
M6824 as 6742	Latitude 72°03.8'	Longitude 161°50.9'
	Depth 24 m	Sediment type: gravely silty sand
	Field number: B174-162	Date: 8/23/74
M6825 as 6742	Latitude 72°05.09'	Longitude 161°42.60'
	Depth 26.5 m	Sediment type: silty sand/gravel
	Field number: B174-163	Date: 8/23/74
M6826 as 6742	Latitude 71°45.1	Longitude 160°52.1
	Depth 50 m	Sediment type: silty sand
	Field number: B174/164	Date: 8/24/74
M6827 as 6742	Latitude 71°46.4'	Longitude 159°46.4'
	Depth 47 m	Sediment type: sandy silty clay
	Field number: B174-165	Date: 8/24/74
M6828 as 6742	Latitude 71°44.5'	Longitude 158°40.9'
	Depth 56 m	Sediment type: silty clay
	Field number: B174-166	Date: 8/24/74

M6807 as 6742	Latitude 70°30.8'	Longitude 168°44'
	Depth 40 m	Sediment type: fine sand
	Field number: B174-143	Date: 8/18/74
M6808 as 6742	Latitude 168°43'	Longitude 68°43.8'
	Depth	Sediment type: silty sand/pea gravel
	Field number: B147-144	Date: 8/19/74
M6809 as 6742	Latitude 71°06.6'	Longitude 168°45.6'
	Depth 48 m	Sediment type sandy-silty clay
	Field number: B174-145	Date: 8/19/74
M6810 as 6742	Latitude 71°27.8	Longitude 168°47.7'
	Depth 39 m	Sediment type: silty clay
	Field number: B174-146	Date: 8/19/74
M6811 as 6742	Latitude 72°11.7	Longitude 168°44.3'
	Depth 53 m	Sediment type: silty clay
	Field number: B174-148	Date: 8/19/74
M6812 as 6742	Latitude 72°26.3'	Longitude 168°39.2
	Depth 53 m	Sediment type
	Field number: B174-149	Date: 8/20/74
M6813 as 6742	Latitude 72°27.9'	Longitude 167°28.1'
	Depth 50 m	Sediment type: silty clay
	Field number: B174-150	Date: 8/20/74
M6814 as 6742	Latitude 72°26.2'	Longitude 166°20'
	Depth 45 m	Sediment type: silty clay
	Field number: B174/151	Date: 8/20/74
M6815 as 6742	Latitude 72°26'	Longitude 165°06.1
	Depth 48 m	Sediment type: sandy silt/clay
	Field number: B174-152	Date: 8/20/74
M6816 as 6742	Latitude 72°26.4'	Longitude 163°57.0'
	Depth 55 m	Sediment type: silty clay
	Field number: B174-153	Date: 8/20/74
M6817 as 6742	Latitude 72°04.6'	Longitude 164°20.0'
	Depth 35 m	Sediment type: silty clay
	Field number: B174-154	Date: 8/20/74

M6840 as 6742	Latitude 68°50'	Longitude 167°59'
	Depth 51 m	Sediment type: sandy silty clay
	Field number: B174-180	Date: 8/26/74
M6842 as 6742	Latitude 67°25.9	Longitude 168°50.9'
	Depth 45 m	Sediment type: silty clay
	Field number: B174-181	Date: 8/29/74
M6843 as 6742	Latitude 67°06.5'	Longitude 168°27.3'
	Depth 44 m	Sediment type: clayey silt
	Field number: B174-182	Date: 8/29/74
M6844 as 6742	Latitude 66°50.1	Longitude 167°51.9'
	Depth 33 m	Sediment type: sandy silt
	Field number: B174-183	Date: 8/30/74