Demersal Fishes and Benthic Invertebrates off Tillamook Bay, Oregon, in July 1985

by
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COASTAL ZONE AND ESTUARINE STUDIES

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INTRODUCTION

In July 1984, the Habitat Investigations Task of the National Marine Fisheries Service (NMFS) entered into a cooperative agreement with the Planning Division of the U.S. Army Corps of Engineers (COE) Portland District to study the fish and benthic invertebrate communities of four offshore (Oregon) interim dredge disposal sites. This information was needed by the COE for their application to obtain final designation of the interim disposal sites by the Environmental Protection Agency. Results of the study (Emmett et al. 1987) showed that benthic invertebrate populations in the area off Tillamook Bay were significantly higher than similar offshore areas near Depoe Bay, Siuslaw River, and Umpqua River (Fig. 1). The Tillamook Bay interim disposal site last received dredge spoils in 1977, when the Tillamook Bay bar sediments were deposited there.

The present study was initiated in July 1985 to sample benthic invertebrates and demersal fishes off Tillamook Bay in summer, a season not sampled during the previous surveys.

METHODS

Trawling (Fishes and Crabs)

Bottom trawling was done with an 8-m semi-balloon shrimp trawl that had overall mesh size of 38.1 mm (stretched); a 12.7-mm mesh liner was inserted in the cod end to ensure retention of small fishes and invertebrates. Fishing width of the trawl was estimated to be 5 m. Each trawling effort was generally 10 min in duration. Position fixes were determined using Loran- C navigational equipment (see Appendix A for Loran-C values for each station).

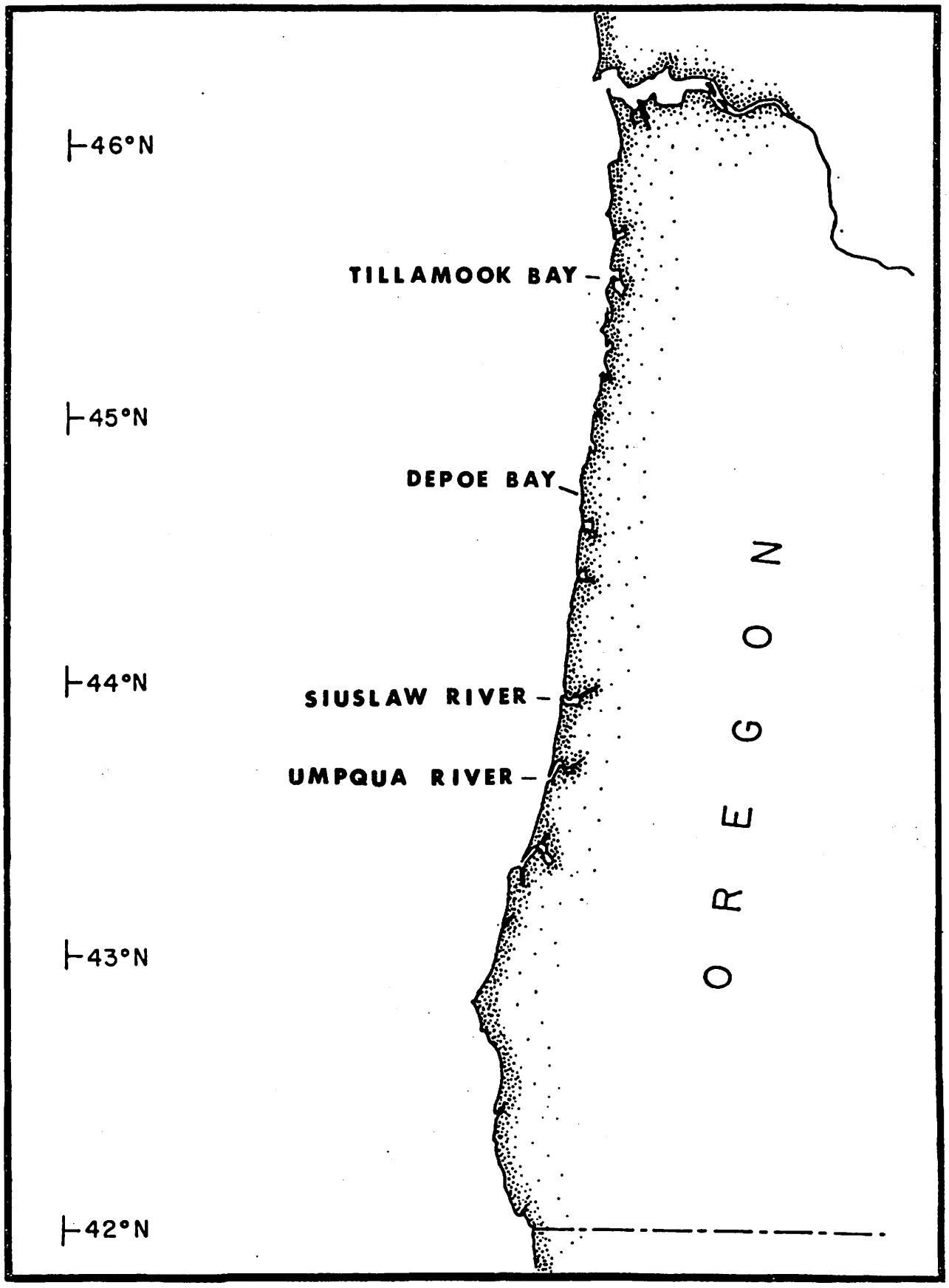

Figure 1.--Locations of the four interim dredge disposal areas along the Oregon coast.

We sampled at four stations near Tillamook Bay, Oregon, in July 1985 (Fig. 2). All sample stations were located along the 90-ft depth contour, except for Station T-7, where hang ups necessitated moving to the 80-ft depth contour. The trawl sites were selected to determine if there were large differences in fish and crab densities along a north-south transect.

All fishes and crabs captured were placed in labeled 19-liter (5-gal) buckets containing a buffered solution of 5% formaldehyde and seawater. If a fish was too large to fit into a bucket, it was identified, measured, weighed, and its stomach removed and placed in a labeled plastic bag containing a 5% formaldehyde solution. At the lab, fishes and crabs were rinsed in fresh water, measured (total and standard lengths, mm), and weighed (g). Crabs were measured across the carapace just anterior to the tenth anterolateral spines. For each trawl effort, a subsample of 20 fishes and crabs for each size class (for each species) was measured and weighed. When more than 20 of a size class were captured, the remainder was counted and weighed as a group.

Box-coring (Benthic Invertebrates)

The 22 box-core stations were located along four transects off Tillamook Bay, Oregon, with each transect running east to west (shallow to deep water) (Fig. 3). These were the same stations used during the previous surveys, except two northern reference stations were not sampled, and two additional stations were added to make a southern transect (Stations T-4-1 to T-4-4). This fourth transect was added to determine if benthic invertebrate densities to the south were comparable to the high densities in the northern areas. Loran-C navigational readings were recorded at each station (Appendix A), enabling replication and reoccupation of the stations at later dates.

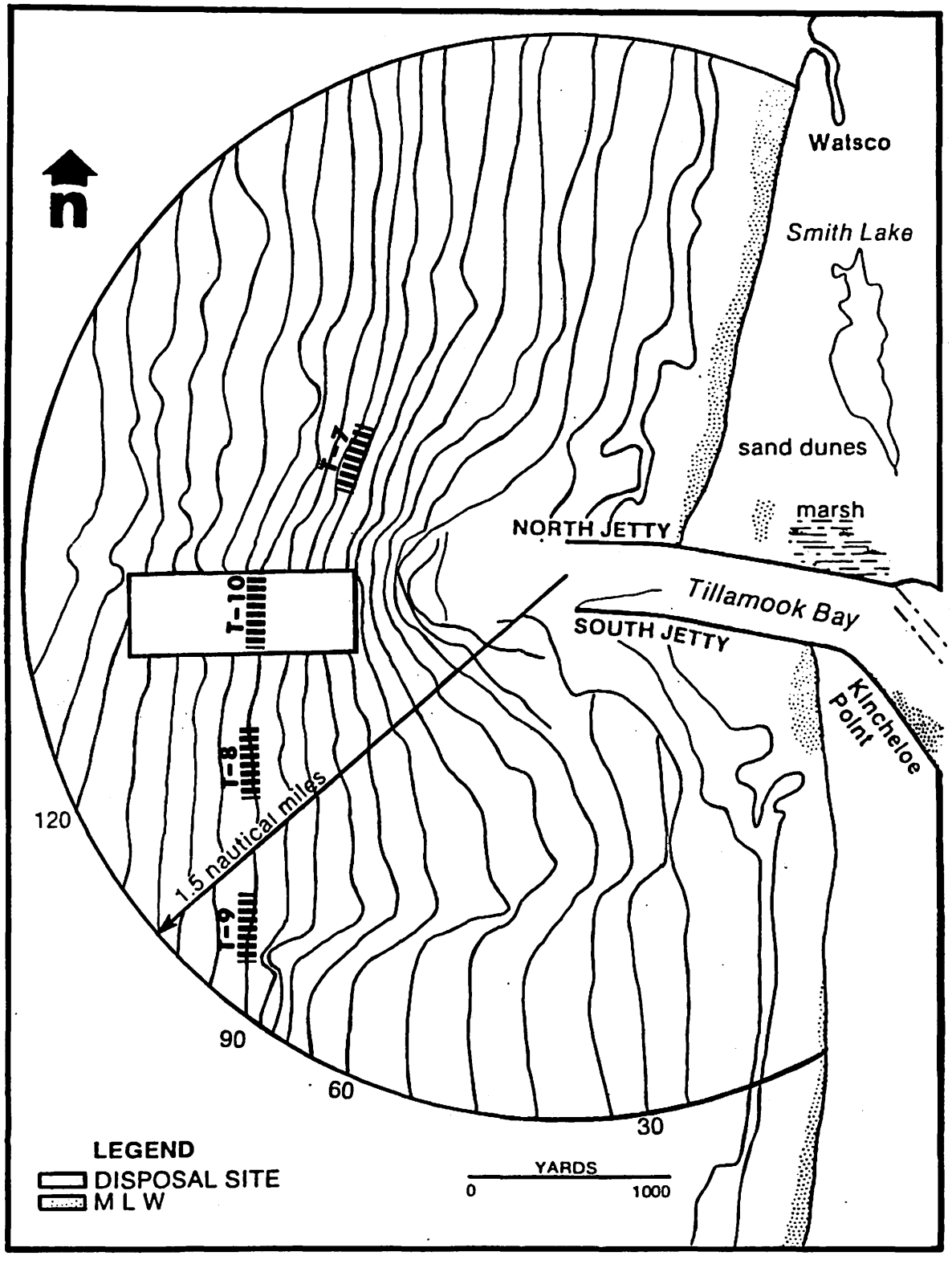

Figure 2.--Locations of the four trawl stations and the dredge disposal site off Tillamook Bay, Oregon; depth contours are in feet.

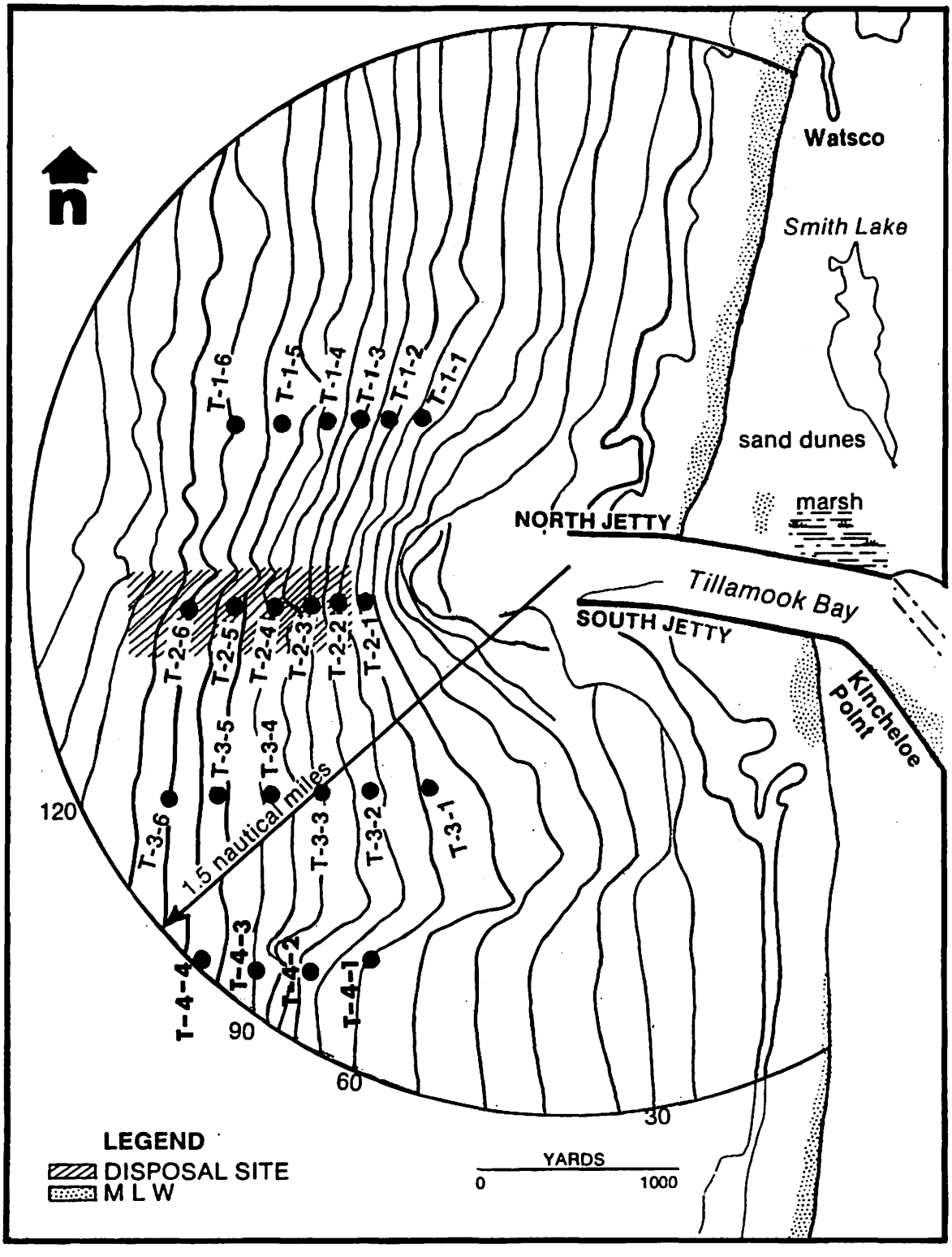

Figure 3.--Locations of the 22 benthic invertebrates stations and the dredge disposal site near Tillamook, Oregon, July 1985; depth contours are in feet.

Benthic infaunal samples were collected with a 0.096 m^2 Gray-O'Hara box corer (Pequegnat et al. 1981). Six box-core samples were collected at each of the 22 stations (Fig. 3). Five of these samples were individually sieved through a 0.5-mm diameter mesh screen, and the residue, containing the macroinvertebrates, was placed in jars and preserved in a buffered 5% formaldehyde solution containing rose bengal (a protein stain). The sixth core sample was subsampled for sediment analysis. Sediment analysis was done by the COE (Portland, Oregon). Sediment grain size was determined by sieving, and organic content was determined by burning for 1 hour at 600°C.

At the lab, preserved benthic invertebrate samples were washed in fresh water, and the organisms were sorted from three of the samples. Only three of the five replicates were sorted because of funding constraints and time limitations. Also, previous surveys indicated that because of the large numbers of organisms per sample, three replicates per site would adequately describe the benthic community (Emmett et al. 1987). Organisms were identified to the lowest possible taxonomic level (usually species) and counted. All specimens were placed in 70% ethyl alcohol and stored in vials at the Hammond, Oregon, Field Station (NMFS). A representative subsample of the polychaete Owenia fusiformis was measured for length-frequency analysis.

Data Analyses

Trawling (Fishes and Crabs)

The computer program LORAN/AND/DISTANCE on the Northwest and Alaska Fisheries Center's Burroughs (B7800)[1] computer was used to calculate the distance fished. By using distance fished, fishing width of the trawl (5 m), and catch data, we estimated densities of fishes and crabs (number/ha). Another computer program on the B7800 computer was used to produce a descriptive summary of each trawling effort (Appendix B). Output from the program included a species list for each trawl, the number and weight (g) of fishes and crabs captured (total and by species), number/ha (total and by species), weight/ha (total and by species), and four community structure indices. The four indices are the Shannon-Wiener Diversity Index (H') (Krebs 1978), Simpson Diversity Value (SDV) (Simpson 1949), Species Richness (SR) (Margalef 1958), and Species Evenness (J) (Pielou 1966).

Diversity was calculated for each trawl effort using the Shannon-Wiener Diversity Index:

$$H' = - \sum_{i=1}^{S} Pi \log_2 Pi$$

where H' = Shannon-Wiener Diversity Index, Pi = Xa/n (Xa is the number of individuals of a particular species in a sample, and n is the total number of all individuals in the sample), and S = number of species.

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[1] Reference to trade names does not imply endorsement by NOAA, National Marine Fisheries Service.

A second diversity index, the Simpson Diversity Value, was also calculated for each trawl sample:

$$SDV = 1 - \sum_{i=1}^{S} Pi^2$$

Diversity values are sensitive to two components, the number of species in a sample (species richness) and the distribution of individuals among species (species evenness). Species richness was estimated using Margalef's formula:

$$SR = (S-1) / \ln(N)$$

where S = number of species and N = total number of individuals at the station.

Species evenness was described using the Evenness Index:

$$J = H' / \log_2 S$$

where J = Evenness Index, H'= Shannon-Wiener Diversity Index, and S = number of species.

Box-coring (Benthic Invertebrates)

Benthic invertebrate data were analyzed using a computer program on the B7800 computer. The three benthic invertebrate samples sorted from each station were treated as replicates, enabling us to calculate a mean number/m^2 and a standard deviation for each species. Also, for each station the program calculated the number of species, mean number of invertebrates/sample (box core) and standard deviation, and mean total number of invertebrates/m^2 and standard deviation (Appendix C). The community structure indices used in the trawling analyses were also calculated for the benthic invertebrate data. Cluster analysis, using the Bray-Curtis dissimilarity index with a group-averaging fusion strategy (Clifford and Stephenson 1975), was used to identify station groupings that had similar species and densities. A dissimilarity value $\geq$ 0.5

was considered a significant difference between groups. The mean number/m^2 for each species per station was used in this analysis. Species which had densities < 10/m^2 were excluded from the analysis to reduce the effect of rare species.

Sediments

Mean grain size (phi), percent silt-clay, and percent organic matter were calculated for each station. Analysis of variance (ANOVA) was used to compare the sediment characteristics (mean grain size, percent silt-clay, and percent organic matter) of the station groupings defined by cluster analysis of benthic invertebrate densities.

RESULTS

Fishes and Crabs

The Tillamook Bay area had a mean number of 1,231 fishes and crabs/ha during July 1985 (Table 1), but there was wide variation in catches among stations. Station T-7, located just north of the disposal site, had only 249 fishes and crabs/ha. However, Station T-8, located just south of the disposal site, had 2,624 fishes and crabs/ha. Diversity values (H' and SR) were also highest for Station T-8.

The large differences in trawl catches were primarily due to high numbers of Dungeness crabs, Cancer magister, at Station T-8 (Table 2; Appendix B). Other important species captured were speckled sanddab, Citharichthys stigmaeus; Pacific tomcod, Microgadus proximus; and English sole, Parophrys vetulus (Table 2). The numerically dominant fishes were primarily juveniles (Fig. 4). Most of the Dungeness crabs were young-of-the-year.

Table 1.--Summaries of trawl data collected at the Tillamook Bay interim disposal site, July 1985. Depth (ft) is shown in ().

Station (ft)	Number of taxa	No./ha	Wt/ha (g)	H'[a/]	J[b/]	SDV[c/]	SR[d/]
T-7 (80)	8	249	4,157	2.54	0.85	0.78	2.06
T-8 (90)	16	2,624	21,136	2.64	0.66	0.73	2.39
T-9 (90)	13	1,436	13,575	2.16	0.58	0.74	2.11
T-10 (90)	11	614	6,919	2.42	0.70	0.74	2.07
Mean	12	1,231	11,447	2.44	0.70	0.75	2.16

a/ Shannon-Wiener Diversity Index.
b/ Species Evenness.
c/ Simpson Diversity Value.
d/ Species Richness.

Table 2.--Catch summaries (number/ha) for fishes and crabs captured by 8-m trawl near Tillamook Bay, July 1985.

Species	Station			
	T-7	T-8	T-9	T-10
Big skate	0	5	0	0
Spotted ratfish	8	5	10	0
Unidentified juv. smelt	0	74	0	5
Pacific tomcod	41	241	172	260
Saddleback gunnel	0	0	5	0
Black rockfish	17	0	0	0
Unidentified rockfish	8	0	0	0
Kelp greenling	0	15	0	0
Lingcod	0	15	0	0
Pacific staghorn sculpin	0	0	0	5
Unidentified sculpin	25	0	5	0
Sturgeon poacher	0	0	5	0
Warty poacher	0	162	5	15
Tubenose poacher	25	88	5	0
Pricklebreast poacher	0	93	5	0
Showy snailfish	0	29	5	5
Unidentified snailfish	0	54	0	5
Speckled sanddab	100	349	418	93
Butter sole	0	5	0	20
English sole	0	172	496	29
Sand sole	0	54	5	49
Dungeness crab	25	1,263	300	128
Total	249	2,624	1,436	614

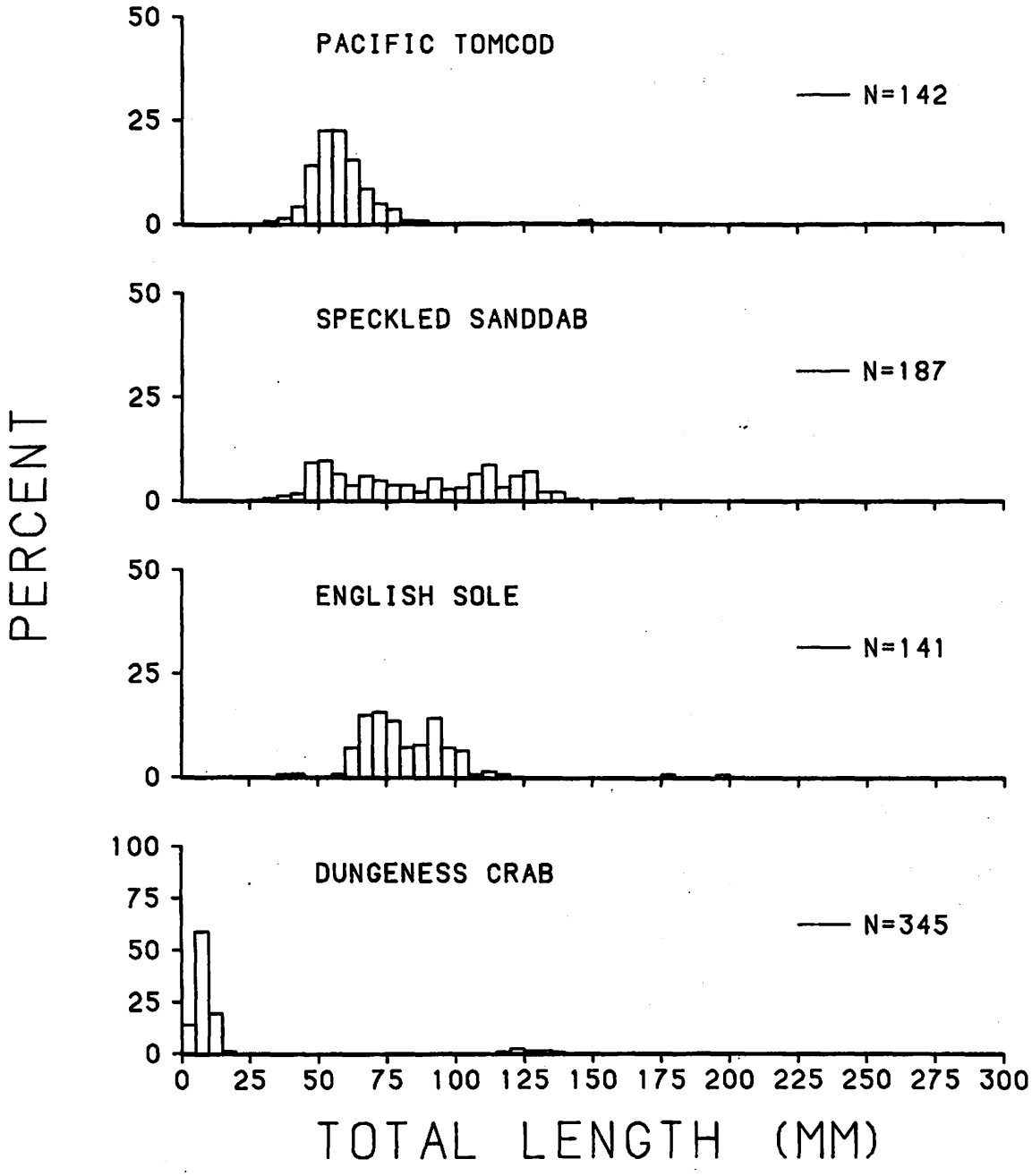

Figure 4.--Length frequency distributions of the three most abundant fish species and Dungeness crab captured near Tillamook Bay, Oregon, July 1985. Carapace widths are shown for Dungeness crab.

Benthic Invertebrates

The study area off Tillamook Bay had a diverse benthic invertebrate community (Appendix C). A total of 155 different taxa were identified (Table 3; Appendix D). The highest density of benthic invertebrates (42,743/m^2) was found at Station T-4-2, and the lowest density (1,198/m^2) was at Station T-2-1 (Table 3). In general, the shallow stations (60 ft) had the lowest densities, although transect T-3 also had low densities. The data suggested a direct relationship between number of taxa and densities, with high numbers of taxa associated with high invertebrate densities. Diversity values (H' and SD) showed an inverse relationship to densities; high diversity values were associated with low invertebrate densities. This occurred because stations with high invertebrate densities were numerically dominated by Owenia fusiformis, a tube-dwelling Oweniidae polychaete. Other important species were Spiophanes bombyx (Spionidae polychaete) and cumaceans, Diastylopsis spp. and D. dawsoni (Table 4). Length-frequency analysis of the O. fusiformis population revealed two size-groups (Fig. 5)-- a short-size group with a mean length of 2.1 mm and a long-size group with a mean length of 22.7 mm. Most of the individuals in the larger size-class contained eggs.

Cluster analysis showed four cluster groups which were easily identified by density (Fig. 6). The high density group consisted of stations located on the northern two transects and the southern transect. Transect T-3, located just south of the disposal site, did not have any stations that occurred in the high density cluster group. The moderate density group (3,800-5,000 benthic invertebrates/m^2) consisted of two sites in the disposal area and one site north and south of the disposal area.

Table 3.--Characteristics of the benthic invertebrate community near Tillamook Bay, July 1985. Depths (ft) are shown in ( ).

Station (ft)	Number of taxa	Density No./m^2	Density SD	H'[a]	J[b]	SDV[c]	SR[d]
T-1-1 (60)	36	2,010	1,035	3.22	0.62	0.75	5.50
T-1-2 (70)	62	11,573	15,544	2.04	0.34	0.55	7.52
T-1-3 (80)	60	10,726	918	1.85	0.31	0.42	7.34
T-1-4 (90)	53	9,743	2,804	1.75	0.30	0.42	6.68
T-1-5 (100)	57	16,024	7,810	1.08	0.18	0.22	6.76
T-1-6 (115)	42	3,809	715	2.06	0.38	0.47	5.86
T-2-1 (60)	33	1,198	263	3.87	0.77	0.90	5.48
T-2-2 (70)	34	1,694	156	3.72	0.73	0.89	5.33
T-2-3 (80)	37	4,014	2,064	2.68	0.51	0.70	5.10
T-2-4 (90)	63	14,576	5,073	1.41	0.24	0.32	7.43
T-2-5 (100)	52	10,212	4,439	1.90	0.33	0.48	6.39
T-2-6 (115)	49	4,625	1878	3.14	0.56	0.76	6.67
T-3-1 (60)	44	1,743	388	4.10	0.75	0.91	6.91
T-3-2 (70)	46	1,462	268	4.32	0.78	0.93	7.45
T-3-3 (80)	48	1,667	75	4.42	0.79	0.94	7.61
T-3-4 (90)	56	4,934	3,315	3.10	0.53	0.73	7.58
T-3-5 (100)	49	2,382	104	4.09	0.73	0.90	7.35
T-3-6 (115)	42	1,896	847	3.66	0.68	0.85	6.51
T-4-1 (60)	39	2,156	867	3.43	0.65	0.81	5.91
T-4-2 (80)	65	42,743	9,158	1.51	0.25	0.39	6.80
T-4-3 (90)	73	25,733	16,840	1.48	0.24	0.36	8.08
T-4-4 (100)	71	25,778	8,563	1.27	0.21	0.28	7.85
Combined[e]	155	9,123	11,556	2.37	0.33	0.53	14.14

[a] Shannon-Wiener Diversity Index.
[b] Species Evenness.
[c] Simpson Diversity Value.
[d] Species Richness.
[e] Replicates combined for all stations.

Table 4.--Summary of benthic invertebrate collections near Tillamook Bay, July 1985. Only dominant taxa from each major category are shown.

Taxon	Total number	Percent frequency of occurrence	Density (no./m^2) Mean	SD
Scoloplos armiger	481	97	76	77
Spiophanes bombyx	4,245	100	670	594
Chaetozone setosa	562	97	89	79
Owenia fusiformis	39,015	94	6,158	9,548
Miscellaneous	1,811	100		
POLYCHAETA (TOTAL)	46,114	100	7,278	9,936
Olivella pycna	370	79	58	78
Modiolus spp.	897	52	142	314
Tellina modesta	353	80	56	61
Siliqua sloati	913	59	144	489
Miscellaneous	782	100		
MOLLUSCA (TOTAL)	2,815	97	444	801
Diastylopsis spp.	2,408	15	380	2,748
Diastylopsis dawsoni	1,927	70	304	1,203
Leucon subnasica	130	36	21	56
Miscellaneous	269	100		
MYSIDACEA/CUMACEA (TOTAL)	4,734	94	747	3,618
Eohaustorius sencillus	690	89	109	105
Photis macinerneyi	479	80	76	113
Mandibulophoxus gelesi	339	47	54	78
Rhepoxynius vigitegus	359	83	57	53
Foxiphalus major	458	82	72	84
Miscellaneous	1,040	100		
AMPHIPODA (TOTAL)	3,365	100	531	244
Amphiodia spp.	199	89	31	30
Dendraster excentricus	15	15	2	6
Miscellaneous	4	6		
ECHINODERMATA (TOTAL)	218	89	34	32
Nemertinea	213	94	34	23
Synidotea bicuspida	64	35	10	24
Pagurus spp.	62	30	10	30
Miscellaneous	216	100		
OTHER (TOTAL)	555	98	88	60
GRAND TOTAL	57,801		9,123	11,556

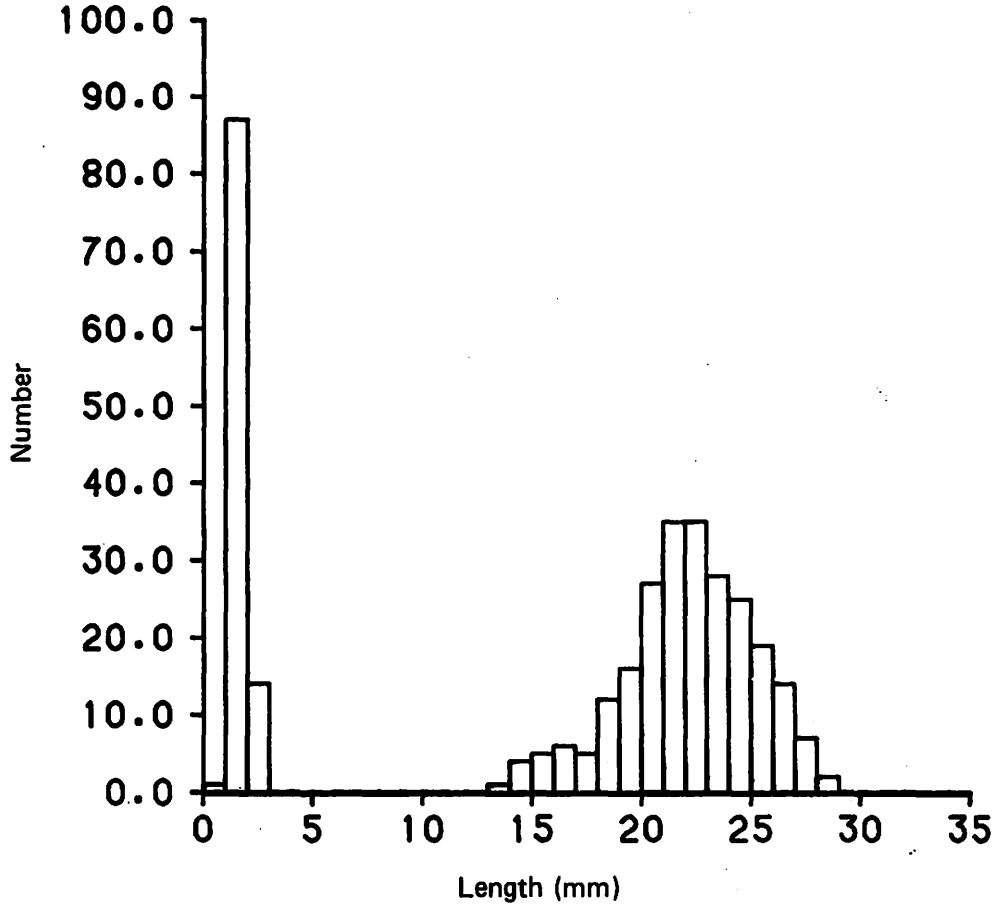

Figure 5.--Length frequency distributions of a representative subsample of Owenia fusiformis captured near Tillamook Bay, Oregon, July 1985.

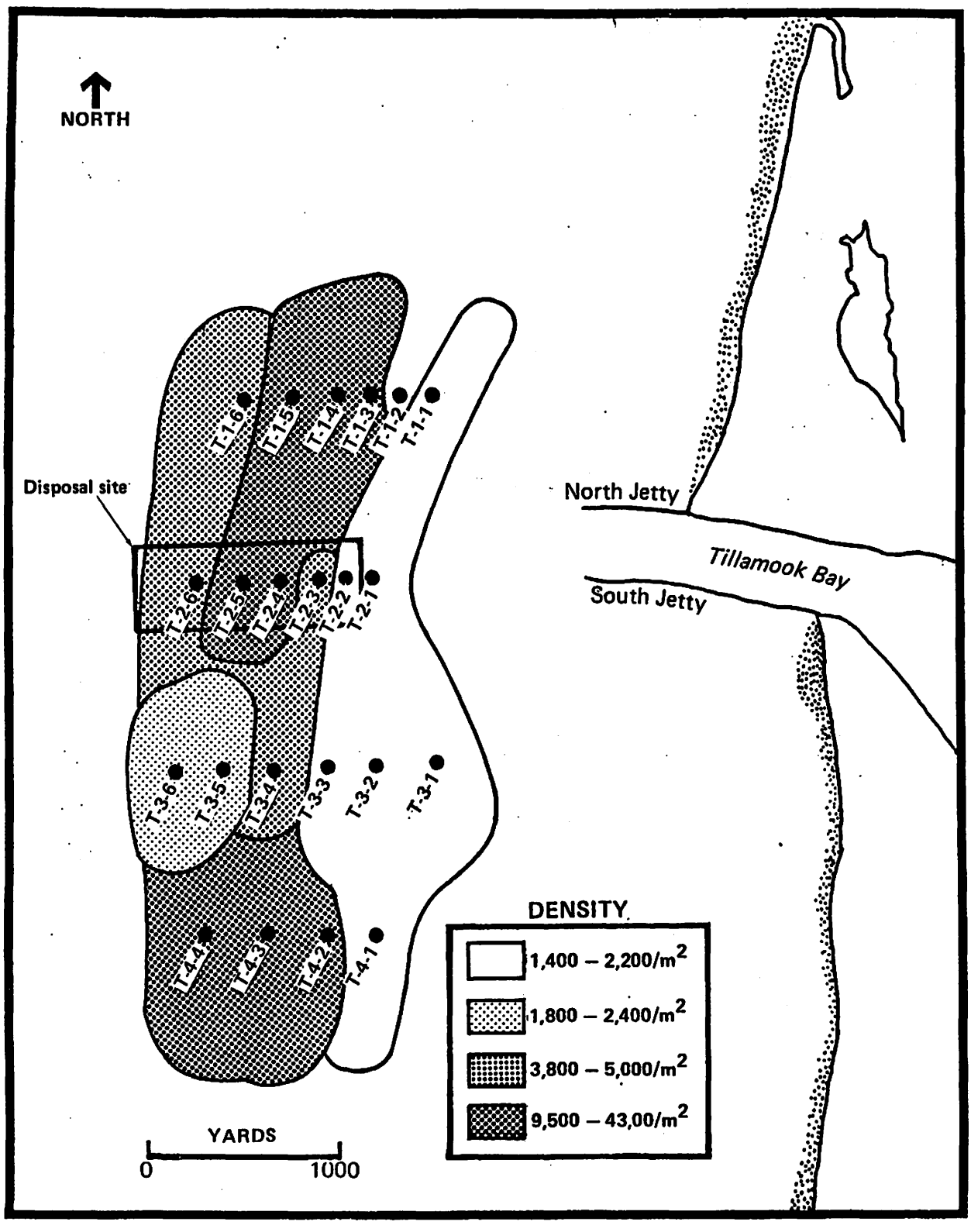

Figure 6.--Locations of the benthic invertebrate cluster groups identified near Tillamook Bay, Oregon, July 1985.

There were two lower density cluster groups that differed primarily in species composition. The lowest density cluster group was comprised primarily of the shallow-water sites, whereas the other low density group was located at the two deep-water stations (Stations T-3-5 and T-3-6). Although Station T-1-2 had high invertebrate densities, it did not occur in any cluster group because of the large numbers of cumaceans (Diastylopsis spp.).

Sediments

The sediment structures of the benthic stations off Tillamook Bay were similar (Table 5). There were no significant differences (ANOVA, $P > 0.05$) between the clustered station groups for any of the sediment characteristics.

Table 5.--Sediment structure of 22 benthic stations off Tillamook Bay, Oregon, July 1985.

Station	Date	Mean grain size (phi)	Percent silt-clay	Percent organic matter
T-1-1	24 Jul	2.7	0.0	1.1
T-1-2	25 Jul	3.0	0.0	1.2
T-1-3	24 Jul	3.0	0.0	0.9
T-1-4	24 Jul	3.1	1.0	1.4
T-1-5	24 Jul	3.1	1.0	1.4
T-1-6	29 Jul	3.2	0.0	1.0
T-2-1	29 Jul	2.9	1.0	1.9
T-2-2	25 Jul	3.0	1.0	1.7
T-2-3	28 Jul	3.0	1.0	1.4
T-2-4	25 Jul	3.0	1.0	1.2
T-2-5	26 Jul	3.0	0.0	1.2
T-2-6	25 Jul	3.1	1.0	1.8
T-3-1	26 Jul	3.0	1.0	1.6
T-3-2	26 Jul	3.0	0.0	1.5
T-3-3	26 Jul	3.0	1.0	1.1
T-3-4	26 Jul	3.0	0.0	1.5
T-3-5	27 Jul	3.1	1.0	1.6
T-3-6	27 Jul	3.1	1.0	1.6
T-4-1	26 Jul	3.1	0.0	1.0
T-4-2	26 Jul	3.1	1.0	2.6
T-4-3	27 Jul	3.1	1.0	1.4
T-4-4	27 Jul	2.2	0.0	2.6
Mean		3.0	0.6	1.5
Standard deviation		0.2	0.5	0.4

DISCUSSION

The summer trawl survey was not exactly comparable to the previous two trawl surveys (Emmett et al. 1987) because of different station locations. The overall mean density (1,231 fishes and crabs/ha) was about halfway between the fall survey (1,696/ha) and the winter survey (919/ha). The high catch of fishes and Dungeness crabs at Station T-8 was unexpected, since this trawl station corresponded to benthic invertebrate transect T-3, the transect with the lowest benthic invertebrate densities. This suggests that benthic infaunal abundance may not be a determining factor for fish and crab distributions off Tillamook Bay. Fish and crab densities may correlate with epibenthic invertebrate densities. However, epibenthic invertebrates are not quantitatively sampled by the box corer.

The overall benthic invertebrate density (9,123/m^2) was about halfway between those of the previous fall and winter surveys, 15,790/m^2 and 4,122/m^2, respectively. These densities are higher than those reported elsewhere off the Oregon coast (Hancock et al. 1984). The number of taxa found in the summer survey (155) was similar to what was identified during the previous fall survey (168).

Since 67.5% of the total number of benthic invertebrates off Tillamook Bay were *Owenia fusiformis* (this survey), spawning and recruitment by this species play a dominant role in this benthic community. *O. fusiformis* was spawning during July 1985, as evidenced by the presence of two size-classes. The smaller individuals represented the newly recruited population, and the larger individuals the spawning population. Since many of the larger *O. fusiformis* had

eggs, additional recruitment undoubtedly occurred; consequently, by fall, benthic invertebrate densities off Tillamook Bay probably reached the high densities reported in September 1984. The summer survey (July 1985) was conducted almost 1 year after the fall survey (September 1984) and indicated that the high benthic invertebrate densities off Tillamook Bay were an annual occurrence.

The sediment structure off Tillamook Bay did not vary significantly between areas of high and low benthic invertebrate densities. This suggests that other physical and biological factors were responsible for the distribution and abundance of benthic infauna off Tillamook Bay.

This and the previous study (Emmett et al. 1987) did not identify the physical and biological factors that caused the high benthic invertebrate standing crop. Nor did the studies identify the size of the area with high benthic invertebrate densities. The benthic data (this study; Emmett et al. 1987) indicated that benthic transect T-3 had the lowest numbers of benthic infauna. However, densities of Dungeness crabs and some fishes were very high along benthic transect T-3. We recommend that the areal extent of high fish and invertebrate densities off Tillamook Bay be investigated to better define possible dredged material disposal sites.

CONCLUSIONS

The three surveys -- summer (this study), fall, and winter (Emmett et al. 1987) -- conducted near Tillamook Bay indicated that densities of fishes, crabs, and benthic invertebrates increased from summer to fall and decreased in winter. Recruitment by O. fusiformis in summer was largely responsible for the large

numbers of benthic invertebrates found in the fall off Tillamook Bay. The high densities of benthic invertebrates probably occur annually.

This report does not constitute NMFS's formal comment under the Fish and Wildlife Coordination Act or the National Environmental Policy Act.

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APPENDIX

Data Tables

Appendix Table 1.--Loran-C navigational values for benthic and trawl sampling stations off Tillamook Bay, Oregon, July 1985.

BENTHIC STATIONS

Station	Depth (ft)	Loran Readings	
T-1-1	60	12375.0	28007.3
T-1-2	70	12375.0	28007.0
T-1-3	80	12374.6	28006.4
T-1-4	90	12371.5	28007.2
T-1-5	100	12371.4	28006.8
T-1-6	115	12373.3	28006.1
T-2-1	60	12377.9	28006.1
T-2-2	70	12377.6	28006.6
T-2-3	80	12377.8	28006.3
T-2-4	90	12378.0	28006.0
T-2-5	100	12378.0	28005.9
T-2-6	115	12379.2	28005.1
T-3-1	60	12383.2	28005.9
T-3-2	70	12383.5	28005.5
T-3-3	80	12383.5	28005.3
T-3-4	90	12384.0	28004.8
T-3-5	100	12384.2	28004.5
T-3-6	115	12384.4	28004.1
T-4-1	60	12385.3	28005.7
T-4-2	80	12386.5	28004.7
T-4-3	90	12386.9	28004.4
T-4-4	100	12386.7	28004.0

TRAWL STATIONS

Station	Depth (ft)	Loran Readings			
		Beginning		Ending	
T-7	80	12374.7	28006.8	12373.7	27996.9
T-8	90	12385.6	28064.7	12383.8	28004.9
T-9	90	12389.9	28004.2	12388.1	28004.5
T-10	90	12381.6	28005.2	12380.0	28005.7

Appendix Table 2.--Summaries of four 8-m bottom-trawl collections off Tillamook Bay, Oregon, July 1985. Four community structure indices -- H', SDV, SR, and J -- are calculated for each station; see Methods for descriptions of indices.

Station: T-7
Gear: 8-m trawl
Date: 23 Jul 1985
Depth: 80 ft
Distance traveled: 241 m

Species	No.	Total wt.(g)	No./ha	Wt./ha
Spotted ratfish	1	355	8	2,946
Pacific tomcod	5	5	41	41
Black rockfish	2	3	17	25
Unidentified rockfish	1	4	8	33
Unidentified sculpin	3	3	25	25
Tubenose poacher	3	3	25	25
Speckled sanddab	12	125	100	1,037
Dungeness crab	3	3	25	25
Total	30	501	249	4,157

H'=2.54 SDV=0.78 SR=2.06 J=0.85

Appendix Table 2.--Continued.

Station: T-8
Gear: 8-m trawl
Date: 23 Jul 1985
Depth: 91 ft
Distance traveled: 407 m

Species	No.	Total wt.(g)	No./ha	Wt./ha
Big skate	1	243	5	1,194
Spotted ratfish	1	286	5	1,405
Unidentified juv. smelt	15	15	74	74
Pacific tomcod	49	120	241	590
Kelp greenling	3	14	15	69
Lingcod	3	52	15	256
Warty poacher	33	36	162	177
Tubenose poacher	18	21	88	103
Pricklebreast poacher	19	21	93	103
Showy snailfish	6	73	29	359
Unidentified snailfish	11	13	54	64
Speckled sanddab	71	777	349	3,818
Butter sole	1	25	5	123
English sole	35	256	172	1,258
Sand sole	11	738	54	3,627
Dungeness crab	257	1,611	1,263	7,916
Total	534	4,301	2,624	21,136

H'=2.64 SDV=0.73 SR=2.39 J=0.66

Appendix Table 2.--Continued.

Station: T-9
Gear: 8-m trawl
Date: 23 Jul 1985
Depth: 92 ft
Distance traveled: 407 m

Species	No.	Total wt.(g)	No./ha	Wt./ha
Spotted ratfish	2	713	10	3,504
Pacific tomcod	35	57	172	280
Saddleback gunnel	1	4	5	20
Unidentified sculpin	1	1	5	5
Sturgeon poacher	1	1	5	5
Warty poacher	1	1	5	5
Tubenose poacher	1	1	5	5
Pricklebreast poacher	1	1	5	5
Showy snailfish	1	17	5	84
Speckled sanddab	85	406	418	1,995
English sole	101	447	496	2,197
Sand sole	1	17	5	84
Dungeness crab	61	1,096	300	5,386
Total	292	2,762	1,436	13,575

H'=2.16 SDV=0.74 SR=2.11 J=0.58

Appendix Table 2.--Continued.

Station: T-10
Gear: 8-m trawl
Date: 24 Jul 1985
Depth: 90 ft
Distance traveled: 407 m

Species	No.	Total wt.(g)	No./ha	Wt./ha
Unidentified juv. smelt	1	1	5	5
Pacific tomcod	53	101	260	496
Pacific staghorn sculpin	1	72	5	354
Warty poacher	3	16	15	79
Showy snailfish	1	1	5	5
Unidentified snailfish	1	1	5	5
Speckled sanddab	19	336	93	1,651
Butter sole	4	101	20	496
English sole	6	142	29	698
Sand sole	10	611	49	3,002
Dungeness crab	26	26	128	128
Total	125	1,408	614	6,919

H'=2.42 SDV=0.74 SR=2.07 J=0.70

Appendix Table 3.--Summaries of benthic invertebrate collections at 22 stations off Tillamook Bay, Oregon, July 1985. Four community structure indices -- H', SDV, SR, and J -- are calculated for each station; see Methods for descriptions of the indices.

Station no.: T-1-1 Date: 24 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Nemertinea	12	100.00	41.67	37.56
Scoloplos armiger	14	100.00	48.61	57.37
Aricidea suecica	3	33.33	10.42	18.04
Spiophanes bombyx	280	100.00	972.22	692.64
Megelona sacculata	7	100.00	24.31	15.91
Chaetozone setosa	17	66.67	59.03	69.36
Notomastus lineatus	3	66.67	10.42	10.42
Ophelia limacina	30	66.67	104.17	171.48
Thalenessa spinosa	8	100.00	27.78	30.07
Glycinde armigera	1	33.33	3.47	6.01
Nephtys caecoides	7	100.00	24.31	6.01
Onuphis elegans	2	33.33	6.94	12.03
Owenia fusiformis	26	100.00	90.28	120.73
Olivella pycna	9	100.00	31.25	20.83
Macoma expansa	1	33.33	3.47	6.01
Tellina modesta	2	33.33	6.94	12.03
Siliqua sloati	2	66.67	6.94	6.01
Harpacticoida	1	33.33	3.47	6.01
Cirripedia larvae	1	33.33	3.47	6.01
Anchicolurus occidentalis	3	66.67	10.42	10.42
Diastylopsis dawsoni	1	33.33	3.47	6.01
Leucon subnasica	1	33.33	3.47	6.01
Unid. Gammaridae	1	33.33	3.47	6.01
Eohaustorius sencillus	40	100.00	138.89	88.59
Psammonyx longimerus	1	33.33	3.47	6.01
Monoculodes spinipes	3	33.33	10.42	18.04
Photis macinerneyi	20	66.67	69.44	73.16
Ischyroceridae	1	33.33	3.47	6.01
Mandibulophoxus gelesi	38	100.00	131.94	31.82
Rhepoxynius vigitegus	7	33.33	24.31	42.10
Foxiphalus major	10	100.00	34.72	33.48
Shrimp larvae	3	33.33	10.42	18.04
Pagurus spp.	5	66.67	17.36	21.68
Crab larvae (zoeae)	3	66.67	10.42	10.42
Amphiodia spp.	11	100.00	38.19	31.82
Dendraster excentricus	5	66.67	17.36	15.91

Appendix Table 3.--Continued.

Station no.: T-1-1 (continued) Date: 24 Jul 85 Sample size: 3

No. of taxa= 36

Mean no./sample: 193 SD: 99.35

Mean no./m^2: 2,010.42 SD/m^2: 1,034.93

H'= 3.22 SDV= 0.75 SR= 5.50 J= 0.62

Appendix Table 3.--Continued.

Station no.: T-1-2 Date: 25 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Nemertinea	12	100.00	41.67	0.00
Leitoscoloplos pugettensis	1	33.33	3.47	6.01
Scoloplos armiger	17	100.00	59.03	31.82
Paraonella platybranchia	1	33.33	3.47	6.01
Spiophanes bombyx	97	100.00	336.81	21.68
Megelona sacculata	17	100.00	59.03	15.91
Chaetopteridae	1	33.33	3.47	6.01
Chaetozone setosa	14	100.00	48.61	12.03
Heteromastus filiformis	3	33.33	10.42	18.04
Notomastus lineatus	12	100.00	41.67	27.56
Anaitides hartmanae	1	33.33	3.47	6.01
Thalenessa spinosa	7	100.00	24.31	15.91
Hesionidae?	1	33.33	3.47	6.01
Podarkeopsis brevipalpa	1	33.33	3.47	6.01
Streptosyllis sp.	4	66.67	13.89	15.91
Nephtys caecoides	7	66.67	24.31	21.68
Nephtys spp.	1	33.33	3.47	6.01
Onuphis elegans	1	33.33	3.47	6.01
Lumbrineris bicirrata	1	33.33	3.47	6.01
Owenia fusiformis	142	100.00	493.06	465.19
Ampharete acutifrons	1	33.33	3.47	6.01
Amaeana occidentalis	1	33.33	3.47	6.01
Archiannelida	1	33.33	3.47	6.01
Olivella pycna	5	66.67	17.36	15.91
Odostomia spp.	1	33.33	3.47	6.01
Modiolus spp.	1	33.33	3.47	6.01
Macoma expansa	3	66.67	10.42	10.42
Tellina modesta	6	100.00	20.83	18.04
Siliqua sloati	7	100.00	24.31	12.03
Harpacticoida	2	33.33	6.94	12.03
Ostracoda sp. A	1	33.33	3.47	6.01
Anchicolurus occidentalis	28	66.67	97.22	133.94
Diastylopsis spp.	2,139	33.33	7,427.08	12,864.09
Diastylopsis dawsoni	605	100.00	2,100.69	3,566.36
Hemilamprops californica	2	33.33	6.94	12.03
Leucon subnasica	1	33.33	3.47	6.01
Edotea sublittoralis	1	33.33	3.47	6.01
Synidotea bicuspida	1	33.33	3.47	6.01
Ampelisca macrocephala	4	66.67	13.89	15.91
Atylus tridens	1	33.33	3.47	6.01
Eohaustorius sencillus	36	66.67	125.00	130.52
Monoculodes spinipes	3	33.33	10.42	18.04
Synchelidium shoemakeri	4	33.33	13.89	24.06
Photis macinerneyi	5	66.67	17.36	21.68
Cheirimedeia macrocarpa	1	33.33	3.47	6.01

Appendix Table 3.--Continued.

Station no.: T-1-2 (continued) Date: 25 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Ischyroceridae	26	100.00	90.28	111.38
Dyopedos arcticus	1	33.33	3.47	6.01
Mandibulophoxus gelesi	13	100.00	45.14	31.82
Rhepoxynius tridentatus	1	33.33	3.47	6.01
Rhepoxynius abronius	2	33.33	6.94	12.03
Rhepoxynius vigitegus	8	66.67	27.78	24.06
Foxiphalus major	49	66.67	170.14	154.62
Pleusymtes subglaber	1	33.33	3.47	6.01
Caprellidae	1	33.33	3.47	6.01
Shrimp larvae	4	33.33	13.89	24.06
Crangon alaskensis	1	33.33	3.47	6.01
Callianassa californiensis	3	33.33	10.42	18.04
Pagurus spp.	2	66.67	6.94	6.01
Crab larvae (zoeae)	1	33.33	3.47	6.01
Amphiodia spp.	17	100.00	59.03	42.10
Dendraster excentricus	1	33.33	3.47	6.01
Pycnogonidea	1	33.33	3.47	6.01

No. of taxa= 62

Mean no./sample: 1,111 SD: 1,492.21

Mean no./m^2: 11,572.92 SD/m^2: 15,543.81

H'= 2.04 SDV= 0.55 SR= 7.52 J= 0.34

Appendix Table 3.--Continued.

Station no.: T-1-3 Date: 24 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	1	33.33	3.47	6.01
Nemertinea	7	100.00	24.31	6.01
Leitoscoloplos pugettensis	1	33.33	3.47	6.01
Scoloplos armiger	43	66.67	149.31	130.24
Aricidea suecica	1	33.33	3.47	6.01
Paraonella platybranchia	1	33.33	3.47	6.01
Spiophanes bombyx	226	100.00	784.72	492.27
Megelona sacculata	17	66.67	59.03	57.37
Chaetozone setosa	18	100.00	62.50	47.74
Notomastus lineatus	8	66.67	27.78	24.06
Anaitides hartmanae	1	33.33	3.47	6.01
Thalenessa spinosa	3	33.33	10.42	18.04
Hesionidae?	4	66.67	13.89	15.91
Syllidae	1	33.33	3.47	6.01
Cheilonereis cyclurus	1	33.33	3.47	6.01
Glycinde spp.	1	33.33	3.47	6.01
Glycinde armigera	3	33.33	10.42	18.04
Nephtys caecoides	16	100.00	55.56	28.84
Nephtys spp.	1	33.33	3.47	6.01
Onuphis elegans	7	100.00	24.31	15.91
Onuphis spp.	4	33.33	13.89	24.06
Lumbrineris bicirrata	2	66.67	6.94	6.01
Myriochele heeri	19	100.00	65.97	15.91
Owenia fusiformis	2,345	100.00	8,142.36	1,661.79
Ampharete acutifrons	5	100.00	17.36	6.01
Amaeana occidentalis	1	33.33	3.47	6.01
Mitrella gouldii	1	33.33	3.47	6.01
Olivella pycna	31	66.67	107.64	100.09
Cyclostremella spp.	5	66.67	17.36	21.68
Mactra/Spisula spp.	9	66.67	31.25	45.41
Modiolus spp.	30	100.00	104.17	72.92
Tellina modesta	18	100.00	62.50	31.25
Tellina nuculoides	7	66.67	24.31	21.68
Siliqua sloati	3	66.67	10.42	10.42
Ostracoda sp. A	2	66.67	6.94	6.01
Neomysis kadiakensis	1	33.33	3.47	6.01
Diastylopsis spp.	21	33.33	72.92	126.30
Diastylopsis dawsoni	29	100.00	100.69	100.09
Diastylopsis tenuis	5	33.33	17.36	30.07
Hemilamprops californica	1	33.33	3.47	6.01
Leucon subnasica	2	66.67	6.94	6.01
Edotea sublittoralis	3	33.33	10.42	18.04
Synidotea bicuspida	5	100.00	17.36	6.01
Ianiropsis kincaidi	1	33.33	3.47	6.01
Ampelisca macrocephala	5	33.33	17.36	30.07

Appendix Table 3.--Continued.

Station no.: T-1-3 (continued) Date: 24 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no.	SD/m^2
Atylus tridens	10	33.33	34.72	60.14
Eohaustorius estuarius	3	33.33	10.42	18.04
Eohaustorius sencillus	26	66.67	90.28	114.27
Monoculodes spinipes	1	33.33	3.47	6.01
Photis macinerneyi	44	100.00	152.78	89.81
Cheirimedeia macrocarpa	7	66.67	24.31	26.21
Ischyroceridae	11	100.00	38.19	48.11
Dyopedos arcticus	3	33.33	10.42	18.04
Rhepoxynius abronius	23	100.00	79.86	39.44
Rhepoxynius vigitegus	20	66.67	69.44	63.65
Foxiphalus major	15	100.00	52.08	27.56
Pagurus spp.	2	33.33	6.94	12.03
Cancer magister	2	66.67	6.94	6.01
Cancer spp.	1	33.33	3.47	6.01
Amphiodia spp.	5	66.67	17.36	21.68

No. of taxa= 60

Mean no./sample: 1,029.67 SD: 88.14

Mean no./m^2: 10,725.69 SD/m^2: 918.16

H'= 1.85 SDV= 0.42 SR= 7.34 J= 0.31

Appendix Table 3.--Continued.

Station no.: T-1-4 Date: 24 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	2	66.67	6.94	6.01
Nemertinea	20	100.00	69.44	24.06
Leitoscoloplos pugettensis	2	33.33	6.94	12.03
Scoloplos armiger	6	100.00	20.83	18.04
Paraonella platybranchia	2	66.67	6.94	6.01
Spiophanes bombyx	230	100.00	798.61	299.08
Megelona sacculata	11	100.00	38.19	21.68
Chaetozone setosa	11	100.00	38.19	26.21
Capitella capitata	2	33.33	6.94	12.03
Heteromastus filiformis	2	66.67	6.94	6.01
Notomastus lineatus	8	100.00	27.78	21.68
Anaitides spp.	1	33.33	3.47	6.01
Thalenessa spinosa	5	100.00	17.36	6.01
Hesionidae?	4	66.67	13.89	15.91
Glycinde armigera	7	100.00	24.31	6.01
Nephtys caecoides	2	66.67	6.94	6.01
Nephtys spp.	3	33.33	10.42	18.04
Onuphis elegans	20	100.00	69.44	30.07
Onuphis spp.	3	66.67	10.42	10.42
Lumbrineris bicirrata	3	66.67	10.42	10.42
Myriochele heeri	17	100.00	59.03	12.03
Owenia fusiformis	2,117	100.00	7,350.69	2,016.38
Ampharete acutifrons	5	100.00	17.36	12.03
Olivella pycna	4	66.67	13.89	15.91
Cyclostremella spp.	2	33.33	6.94	12.03
Mactra/Spisula spp.	11	66.67	38.19	36.58
Modiolus spp.	125	100.00	434.03	208.42
Macoma expansa	2	33.33	6.94	12.03
Tellina modesta	20	100.00	69.44	42.10
Siliqua sloati	18	100.00	62.50	54.13
Ostracoda sp. A	1	33.33	3.47	6.01
Neomysis kadiakensis	1	33.33	3.47	6.01
Anchicolurus occidentalis	2	66.67	6.94	6.01
Diastylopsis dawsoni	2	33.33	6.94	12.03
Edotea sublittoralis	1	33.33	3.47	6.01
Synidotea bicuspida	1	33.33	3.47	6.01
Ampelisca macrocephala	7	100.00	24.31	12.03
Eohaustorius estuarius	2	66.67	6.94	6.01
Eohaustorius sencillus	21	100.00	72.92	75.12
Photis macinerneyi	40	100.00	138.89	88.59
Cheirimedeia macrocarpa	3	66.67	10.42	10.42
Ischyroceridae	6	66.67	20.83	20.83
Dyopedos arcticus	1	33.33	3.47	6.01
Rhepoxynius abronius	17	100.00	59.03	12.03
Rhepoxynius vigitegus	14	100.00	48.61	21.68

Appendix Table 3.--Continued.

Station no.: T-1-4 (continued) Date: 24 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Foxiphalus major	6	66.67	20.83	20.83
Shrimp larvae	2	33.33	6.94	12.03
Pagurus spp.	2	33.33	6.94	12.03
Pinnixa spp.	2	66.67	6.94	6.01
Cancer magister	1	33.33	3.47	6.01
Cancer spp.	1	33.33	3.47	6.01
Amphiodia spp.	7	100.00	24.31	15.91
Dendraster excentricus	1	33.33	3.47	6.01

No. of taxa= 53

Mean no./sample: 935.33 SD: 269.18

Mean no./m^2: 9,743.06 SD/m^2: 2,804.01

H'= 1.75 SDV= 0.42 SR= 6.68 J= 0.30

Appendix Table 3.--Continued.

Station no.: T-1-5 Date: 24 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	2	66.67	6.94	6.01
Nemertinea	8	100.00	27.78	6.01
Polychaete larvae	5	66.67	17.36	15.91
Leitoscoloplos pugettensis	1	33.33	3.47	6.01
Scoloplos armiger	3	100.00	10.42	0.00
Paraonella platybranchia	3	66.67	10.42	10.42
Spiophanes berkeleyorum	1	33.33	3.47	6.01
Spiophanes bombyx	61	100.00	211.81	69.36
Megelona sacculata	5	66.67	17.36	21.68
Chaetozone setosa	7	100.00	24.31	6.01
Heteromastus filiformis	2	66.67	6.94	6.01
Notomastus lineatus	11	100.00	38.19	26.21
Unid. Maldanidae	1	33.33	3.47	6.01
Thalenessa spinosa	4	100.00	13.89	6.01
Hesionidae?	1	33.33	3.47	6.01
Streptosyllis sp.	1	33.33	3.47	6.01
Glycinde armigera	6	66.67	20.83	27.56
Nephtys caecoides	9	100.00	31.25	20.83
Onuphis elegans	39	100.00	135.42	63.36
Onuphis spp.	2	33.33	6.94	12.03
Lumbrineris spp.	1	33.33	3.47	6.01
Lumbrineris bicirrata	1	33.33	3.47	6.01
Myriochele heeri	33	100.00	114.58	58.00
Owenia fusiformis	4,064	100.00	14,111.11	7,017.31
Ampharete acutifrons	1	33.33	3.47	6.01
Amaeana occidentalis	1	33.33	3.47	6.01
Mitrella gouldii	2	33.33	6.94	12.03
Nassarius fossatus	1	33.33	3.47	6.01
Olivella biplicata	1	33.33	3.47	6.01
Olivella pycna	13	66.67	45.14	69.36
Cyclostremella spp.	6	33.33	20.83	36.08
Mactra/Spisula spp.	5	33.33	17.36	30.07
Modiolus spp.	83	100.00	288.19	189.04
Macoma expansa	9	66.67	31.25	27.56
Tellina modesta	38	66.67	131.94	135.55
Siliqua sloati	6	100.00	20.83	10.42
Neomysis kadiakensis	1	33.33	3.47	6.01
Anchicolurus occidentalis	1	33.33	3.47	6.01
Diastylopsis dawsoni	16	100.00	55.56	61.04
Leucon subnasica	3	66.67	10.42	10.42
Edotea sublittoralis	1	33.33	3.47	6.01
Ampelisca macrocephala	6	66.67	20.83	27.56
Eohaustorius estuarius	48	100.00	166.67	136.61
Eohaustorius sencillus	3	33.33	10.42	18.04
Corophium spinicorne	2	66.67	6.94	6.01

Appendix Table 3.--Continued.

Station no.: T-1-5 (continued) Date: 24 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Photis parvidens	1	33.33	3.47	6.01
Photis macinerneyi	18	100.00	62.50	47.74
Cheirimedeia macrocarpa	9	66.67	31.25	31.25
Ischyroceridae	3	66.67	10.42	10.42
Dyopedos arcticus	2	33.33	6.94	12.03
Rhepoxynius abronius	30	100.00	104.17	72.92
Rhepoxynius vigitegus	20	100.00	69.44	66.15
Foxiphalus major	1	33.33	3.47	6.01
Pinnixa spp.	2	66.67	6.94	6.01
Cancer magister	4	66.67	13.89	15.91
Cancer spp. megalops	1	33.33	3.47	6.01
Amphiodia spp.	6	66.67	20.83	27.56

No. of taxa= 57

Mean no./sample: 1,538.33 SD: 749.71

Mean no./m^2: 16,024.31 SD/m^2: 7,809.53

H'= 1.08 SDV= 0.22 SR= 6.76 J= 0.18

Appendix Table 3.--Continued.

Station no.: T-1-6 Date: 29 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	1	33.33	3.47	6.01
Nemertinea	11	100.00	38.19	6.01
Leitoscoloplos pugettensis	3	66.67	10.42	10.42
Scoloplos armiger	9	100.00	31.25	27.56
Spiophanes bombyx	44	100.00	152.78	75.36
Megelona sacculata	6	100.00	20.83	10.42
Chaetozone setosa	6	100.00	20.83	10.42
Notomastus lineatus	9	100.00	31.25	10.42
Halosydna brevisetosa	1	33.33	3.47	6.01
Thalenessa spinosa	2	66.67	6.94	6.01
Hesionidae?	1	33.33	3.47	6.01
Streptosyllis sp.	2	66.67	6.94	6.01
Glycinde armigera	3	66.67	10.42	10.42
Nephtys caecoides	10	100.00	34.72	33.48
Onuphis elegans	8	66.67	27.78	26.21
Myriochele heeri	7	100.00	24.31	6.01
Owenia fusiformis	793	100.00	2,753.47	887.82
Ampharete acutifrons	1	33.33	3.47	6.01
Amaeana occidentalis	1	33.33	3.47	6.01
Olivella pycna	26	100.00	90.28	57.37
Cyclostremella spp.	3	33.33	10.42	18.04
Cylichna attonsa	1	33.33	3.47	6.01
Modiolus spp.	2	33.33	6.94	12.03
Macoma expansa	2	33.33	6.94	12.03
Tellina modesta	3	66.67	10.42	10.42
Siliqua sloati	1	33.33	3.47	6.01
Ostracoda sp. A	3	66.67	10.42	10.42
Diastylopsis dawsoni	2	66.67	6.94	6.01
Hemilamprops californica	1	33.33	3.47	6.01
Synidotea bicuspida	1	33.33	3.47	6.01
Ampelisca agassizi	1	33.33	3.47	6.01
Ampelisca macrocephala	13	100.00	45.14	21.68
Eohaustorius estuarius	28	100.00	97.22	106.40
Eohaustorius sencillus	3	66.67	10.42	10.42
Photis macinerneyi	2	66.67	6.94	6.01
Cheirimedeia macrocarpa	13	66.67	45.14	46.97
Dyopedos arcticus	45	33.33	156.25	270.63
Rhepoxynius abronius	19	100.00	65.97	33.48
Rhepoxynius vigitegus	5	33.33	17.36	30.07
Foxiphalus major	3	33.33	10.42	18.04
Pinnixa spp.	1	33.33	3.47	6.01
Cancer magister	1	33.33	3.47	6.01

Appendix Table 3.--Continued.

Station no.: T-1-6 (continued) Date: 29 Jul 85 Sample size: 3

No. of taxa= 42

Mean no./sample: 365.67 SD: 68.63

Mean no./m^2: 3,809.03 SD/m^2: 714.92

H'= 2.06 SDV= 0.47 SR= 5.86 J= 0.38

Appendix Table 3.--Continued.

Station no.: T-2-1 Date: 29 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Nemertinea	7	100.00	24.31	12.03
Scoloplos armiger	10	100.00	34.72	26.21
Aricidea suecica	5	33.33	17.36	30.07
Paraonella platybranchia	1	33.33	3.47	6.01
Spiophanes bombyx	62	100.00	215.28	167.42
Megelona sacculata	18	100.00	62.50	27.56
Chaetozone setosa	13	100.00	45.14	36.58
Notomastus lineatus	7	66.67	24.31	21.68
Thalenessa spinosa	2	66.67	6.94	6.01
Hesionidae?	1	33.33	3.47	6.01
Glycinde armigera	1	33.33	3.47	6.01
Nephtys caecoides	11	100.00	38.19	15.91
Owenia fusiformis	8	100.00	27.78	12.03
Ampharete acutifrons	1	33.33	3.47	6.01
Nassarius fossatus	1	33.33	3.47	6.01
Olivella pycna	13	100.00	45.14	30.07
Tellina bodegensis	1	33.33	3.47	6.01
Tellina modesta	1	33.33	3.47	6.01
Anchicolurus occidentalis	2	33.33	6.94	12.03
Diastylopsis dawsoni	1	33.33	3.47	6.01
Unid. Gammaridae	1	33.33	3.47	6.01
Ampelisca macrocephala	1	33.33	3.47	6.01
Eohaustorius sencillus	57	100.00	197.92	58.00
Monoculodes spinipes	1	33.33	3.47	6.01
Corophium spinicorne	1	33.33	3.47	6.01
Cheirimedeia macrocarpa	2	33.33	6.94	12.03
Mandibulophoxus gelesi	45	100.00	156.25	70.65
Rhepoxynius vigitegus	15	100.00	52.08	37.56
Foxiphalus major	37	100.00	128.47	42.10
Foxiphalus obtusidens	2	33.33	6.94	12.03
Pagurus spp.	7	66.67	24.31	33.48
Amphiodia spp.	9	100.00	31.25	20.83
Dendraster excentricus	1	33.33	3.47	6.01

No. of taxa= 33

Mean no./sample: 115.00 SD: 25.24

Mean no./m^2: 1,197.92 SD/m^2: 262.90

H'= 3.87 SDV= 0.90 SR= 5.48 J= 0.77

Appendix Table 3.--Continued.

Station no.: T-2-2 Date: 25 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Nemertinea	7	100.00	24.31	6.01
Scoloplos armiger	24	100.00	83.33	41.67
Aricidea suecica	5	66.67	17.36	15.91
Paraonella platybranchia	1	33.33	3.47	6.01
Spiophanes bombyx	91	100.00	315.97	110.40
Megelona sacculata	27	100.00	93.75	18.04
Chaetozone setosa	17	100.00	59.03	66.15
Notomastus lineatus	4	100.00	13.89	6.01
Thalenessa spinosa	5	100.00	17.36	12.03
Trypanosyllis spp.	1	33.33	3.47	6.01
Glycera capitata	2	33.33	6.94	12.03
Nephtys caecoides	7	100.00	24.31	6.01
Nephtys spp.	2	33.33	6.94	12.03
Onuphis elegans	1	33.33	3.47	6.01
Onuphis spp.	1	33.33	3.47	6.01
Owenia fusiformis	14	66.67	48.61	75.36
Olivella biplicata	1	33.33	3.47	6.01
Olivella pycna	3	33.33	10.42	18.04
Tellina modesta	4	66.67	13.89	12.03
Tellina nuculoides	1	33.33	3.47	6.01
Siliqua sloati	1	33.33	3.47	6.01
Anchicolurus occidentalis	1	33.33	3.47	6.01
Diastylopsis tenuis	1	33.33	3.47	6.01
Ampelisca macrocephala	3	66.67	10.42	10.42
Eohaustorius sencillus	82	100.00	284.72	186.73
Photis macinerneyi	1	33.33	3.47	6.01
Mandibulophoxus gelesi	69	100.00	239.58	130.94
Rhepoxynius vigitegus	11	66.67	38.19	57.37
Foxiphalus major	58	100.00	201.39	111.38
Pagurus spp.	29	100.00	100.69	112.35
Crab larvae (zoeae)	1	33.33	3.47	6.01
Amphiodia spp.	11	100.00	38.19	15.91
Dendraster excentricus	2	33.33	6.94	12.03

No. of taxa= 33

Mean no./sample: 162.67 SD: 15.01

Mean no./m^2: 1,694.44 SD/m^2: 156.37

H'= 3.71 SDV= 0.89 SR= 5.17 J= 0.74

Appendix Table 3.--Continued.

Station no.: T-2-3 Date: 28 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Nemertinea	4	100.00	13.89	6.01
Leitoscoloplos pugettensis	1	33.33	3.47	6.01
Scoloplos armiger	14	66.67	48.61	59.23
Paraonella platybranchia	2	66.67	6.94	6.01
Minuspio cirrifera	1	33.33	3.47	6.01
Spiophanes bombyx	100	100.00	347.22	84.84
Megelona sacculata	13	100.00	45.14	15.91
Chaetozone setosa	23	100.00	79.86	6.01
Notomastus lineatus	4	100.00	13.89	6.01
Thalenessa spinosa	1	33.33	3.47	6.01
Glycinde armigera	1	33.33	3.47	6.01
Nephtys caecoides	4	66.67	13.89	15.91
Nephtys spp.	1	33.33	3.47	6.01
Onuphis elegans	2	66.67	6.94	6.01
Owenia fusiformis	595	100.00	2,065.97	1,712.28
Olivella biplicata	3	33.33	10.42	18.04
Olivella pycna	14	66.67	48.61	75.36
Mactra/Spisula spp.	3	33.33	10.42	18.04
Modiolus spp.	6	100.00	20.83	18.04
Macoma expansa	2	33.33	6.94	12.03
Tellina modesta	2	33.33	6.94	12.03
Tellina nuculoides	3	66.67	10.42	10.42
Siliqua sloati	14	100.00	48.61	39.44
Anchicolurus occidentalis	3	66.67	10.42	10.42
Diastylopsis spp.	184	33.33	638.89	1,106.59
Diastylopsis dawsoni	55	33.33	190.97	330.77
Leucon subnasica	2	66.67	6.94	6.01
Edotea sublittoralis	2	66.67	6.94	6.01
Ampelisca macrocephala	1	33.33	3.47	6.01
Eohaustorius estuarius	4	66.67	13.89	15.91
Eohaustorius sencillus	12	66.67	41.67	55.12
Photis macinerneyi	3	66.67	10.42	10.42
Mandibulophoxus gelesi	3	33.33	10.42	18.04
Rhepoxynius abronius	7	100.00	24.31	6.01
Rhepoxynius vigitegus	10	33.33	34.72	60.14
Foxiphalus major	54	100.00	187.50	167.64
Amphiodia spp.	3	100.00	10.42	0.00

Appendix Table 3.--Continued.

Station no.: T-2-3 (continued) Date: 28 Jul 85 Sample size: 3

No. of taxa= 37

Mean no./sample: 385.33 SD: 198.13

Mean no./m^2: 4,013.89 SD/m^2: 2,063.90

H'= 2.68 SDV= 0.70 SR= 5.10 J= 0.51

Appendix Table 3.--Continued.

Station no.: T-2-4 Date: 25 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	1	33.33	3.47	6.01
Nemertinea	13	100.00	45.14	12.03
Leitoscoloplos pugettensis	1	33.33	3.47	6.01
Scoloplos armiger	7	100.00	24.31	12.03
Paraonella platybranchia	2	33.33	6.94	12.03
Spiophanes bombyx	268	100.00	930.56	307.31
Megelona sacculata	21	100.00	72.92	27.56
Chaetozone setosa	28	100.00	97.22	57.37
Notomastus lineatus	4	66.67	13.89	15.91
Ophelia spp.	1	33.33	3.47	6.01
Anaitides hartmanae	1	33.33	3.47	6.01
Thalenessa spinosa	4	100.00	13.89	6.01
Hesionidae?	7	100.00	24.31	15.91
Syllidae	1	33.33	3.47	6.01
Streptosyllis sp.	3	66.67	10.42	10.42
Cheilonereis cyclurus	1	33.33	3.47	6.01
Glycinde spp.	3	66.67	10.42	10.42
Glycinde armigera	8	100.00	27.78	21.68
Nephtys caecoides	8	100.00	27.78	30.07
Nephtys spp.	10	66.67	34.72	31.82
Onuphis elegans	2	66.67	6.94	6.01
Lumbrineris bicirrata	1	33.33	3.47	6.01
Myriochele heeri	28	100.00	97.22	33.48
Owenia fusiformis	3,449	100.00	11,975.69	4,177.40
Ampharete acutifrons	12	100.00	41.67	10.42
Olivella biplicata	1	33.33	3.47	6.01
Olivella pycna	8	66.67	27.78	26.21
Olivella baetica	1	33.33	3.47	6.01
Mangelia spp.	1	33.33	3.47	6.01
Mactra/Spisula spp.	11	100.00	38.19	6.01
Modiolus spp.	27	100.00	93.75	27.56
Macoma expansa	3	66.67	10.42	10.42
Tellina modesta	24	100.00	83.33	58.00
Siliqua sloati	43	100.00	149.31	96.79
Ostracoda sp. A	1	33.33	3.47	6.01
Diastylopsis dawsoni	16	100.00	55.56	26.21
Diastylopsis tenuis	11	66.67	38.19	36.58
Hemilamprops californica	3	66.67	10.42	10.42
Leucon subnasica	3	33.33	10.42	18.04
Edotea sublittoralis	7	100.00	24.31	15.91
Synidotea bicuspida	5	66.67	17.36	21.68
Ampelisca macrocephala	4	66.67	13.89	15.91
Megaluropus longimerus	1	33.33	3.47	6.01
Eohaustorius estuarius	1	33.33	3.47	6.01
Eohaustorius sencillus	3	100.00	10.42	0.00

Appendix Table 3.--Continued.

Station no.: T-2-4 (continued) Date: 25 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Corophium salmonis	1	33.33	3.47	6.01
Corophium spinicorne	1	33.33	3.47	6.01
Photis macinerneyi	69	100.00	239.58	256.00
Cheirimedeia macrocarpa	9	100.00	31.25	20.83
Ischyroceridae	18	100.00	62.50	81.36
Dyopedos arcticus	1	33.33	3.47	6.01
Mandibulophoxus gelesi	1	33.33	3.47	6.01
Rhepoxynius abronius	9	100.00	31.25	0.00
Rhepoxynius vigitegus	9	66.67	31.25	37.56
Foxiphalus major	4	100.00	13.89	6.01
Parapleustes den	1	33.33	3.47	6.01
Tanais sp.	1	33.33	3.47	6.01
Shrimp larvae	2	33.33	6.94	12.03
Pagurus spp.	2	66.67	6.94	6.01
Cancer magister	6	100.00	20.83	18.04
Amphiodia spp.	3	100.00	10.42	0.00
Pycnogonidea	1	33.33	3.47	6.01
Achelia gracilipes	2	66.67	6.94	6.01

No. of taxa= 63

Mean no./sample: 1,399.33 SD: 487.01

Mean no./m^2: 14,576.39 SD/m^2: 5,073.06

H'= 1.41 SDV= 0.32 SR= 7.43 J= 0.24

Appendix Table 3.--Continued.

Station no.: T-2-5 Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Nemertinea	10	100.00	34.72	15.91
Leitoscoloplos pugettensis	1	33.33	3.47	6.01
Scoloplos armiger	22	100.00	76.39	48.11
Paraonella platybranchia	1	33.33	3.47	6.01
Spiophanes berkeleyorum	1	33.33	3.47	6.01
Spiophanes bombyx	413	100.00	1,434.03	396.56
Megelona sacculata	25	100.00	86.81	36.58
Chaetozone setosa	16	100.00	55.56	61.04
Notomastus lineatus	2	33.33	6.94	12.03
Axiothella rubrocincta	1	33.33	3.47	6.01
Anaitides hartmanae	2	33.33	6.94	12.03
Thalenessa spinosa	2	66.67	6.94	6.01
Hesionidae?	3	66.67	10.42	10.42
Glycinde spp.	2	33.33	6.94	12.03
Glycinde armigera	5	100.00	17.36	6.01
Nephtys caecoides	7	100.00	24.31	6.01
Nephtys spp.	5	33.33	17.36	30.07
Onuphis elegans	20	100.00	69.44	93.36
Onuphis spp.	3	66.67	10.42	10.42
Lumbrineris bicirrata	3	100.00	10.42	0.00
Myriochele heeri	16	100.00	55.56	26.21
Owenia fusiformis	2,086	100.00	7,243.06	3,490.88
Ampharete acutifrons	2	66.67	6.94	6.01
Amaeana occidentalis	6	66.67	20.83	20.83
Olivella pycna	8	33.33	27.78	48.11
Cyclostremella spp.	3	33.33	10.42	18.04
Aglaja diomedea	1	33.33	3.47	6.01
Mactra/Spisula spp.	16	66.67	55.56	48.11
Modiolus spp.	53	66.67	184.03	234.39
Tellina modesta	21	66.67	72.92	85.26
Tellina nuculoides	2	33.33	6.94	12.03
Siliqua sloati	30	33.33	104.17	180.42
Ostracoda sp. A	2	66.67	6.94	6.01
Anchicolurus occidentalis	1	33.33	3.47	6.01
Diastylopsis dawsoni	17	100.00	59.03	21.68
Leucon subnasica	2	33.33	6.94	12.03
Synidotea bicuspida	3	66.67	10.42	10.42
Ampelisca macrocephala	8	100.00	27.78	15.91
Eohaustorius estuarius	9	100.00	31.25	36.08
Eohaustorius sencillus	6	100.00	20.83	0.00
Monoculodes spinipes	2	33.33	6.94	12.03
Photis macinerneyi	15	100.00	52.08	47.74
Cheirimedeia macrocarpa	13	100.00	45.14	12.03
Ischyroceridae	12	66.67	41.67	63.36
Dyopedos arcticus	1	33.33	3.47	6.01

Appendix Table 3.--Continued.

Station no.: T-2-5 (continued) Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Rhepoxynius abronius	16	66.67	55.56	48.11
Rhepoxynius vigitegus	15	100.00	52.08	20.83
Foxiphalus major	20	100.00	69.44	66.97
Shrimp larvae	2	66.67	6.94	6.01
Cancer magister	1	33.33	3.47	6.01
Amphiodia spp.	7	100.00	24.31	15.91
Dendraster excentricus	1	33.33	3.47	6.01

No. of taxa= 52

Mean no./sample: 980.33 SD: 426.19

Mean no./m^2: 10,211.81 SD/m^2: 4,439.46

H'= 1.90 SDV= 0.48 SR= 6.39 J= 0.33

Appendix Table 3.--Continued.

Station no.: T-2-6 Date: 25 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	1	33.33	3.47	6.01
Nemertinea	13	100.00	45.14	24.06
Leitoscoloplos pugettensis	5	66.67	17.36	21.68
Scoloplos armiger	24	100.00	83.33	37.56
Paraonella platybranchia	1	33.33	3.47	6.01
Spiophanes bombyx	277	100.00	961.81	256.92
Megelona sacculata	13	100.00	45.14	12.03
Chaetozone setosa	30	100.00	104.17	82.68
Notomastus lineatus	26	100.00	90.28	36.58
Unid. Maldanidae	1	33.33	3.47	6.01
Anaitides hartmanae	1	33.33	3.47	6.01
Streptosyllis sp.	1	33.33	3.47	6.01
Glycinde armigera	8	100.00	27.78	12.03
Nephtys caecoides	9	100.00	31.25	18.04
Onuphis elegans	17	100.00	59.03	49.23
Myriochele heeri	5	100.00	17.36	6.01
Owenia fusiformis	579	100.00	2,010.42	1,569.05
Amaeana occidentalis	2	66.67	6.94	6.01
Mitrella gouldii	1	33.33	3.47	6.01
Olivella pycna	56	100.00	194.44	53.45
Olivella baetica	1	33.33	3.47	6.01
Cyclostremella spp.	2	33.33	6.94	12.03
Modiolus spp.	1	33.33	3.47	6.01
Macoma expansa	2	33.33	6.94	12.03
Tellina modesta	23	100.00	79.86	15.91
Ostracoda sp. A	2	66.67	6.94	6.01
Anchicolurus occidentalis	1	33.33	3.47	6.01
Diastylopsis dawsoni	35	100.00	121.53	61.04
Diastylopsis tenuis	1	33.33	3.47	6.01
Edotea sublittoralis	1	33.33	3.47	6.01
Ampelisca macrocephala	21	100.00	72.92	20.83
Eohaustorius estuarius	48	100.00	166.67	47.74
Eohaustorius sencillus	20	100.00	69.44	51.38
Lysianassidae	2	33.33	6.94	12.03
Monoculodes spinipes	1	33.33	3.47	6.01
Synchelidium shoemakeri	1	33.33	3.47	6.01
Photis macinerneyi	8	66.67	27.78	31.82
Cheirimedeia macrocarpa	10	100.00	34.72	42.10
Ischyroceridae	5	33.33	17.36	30.07
Dyopedos arcticus	1	33.33	3.47	6.01
Rhepoxynius abronius	41	100.00	142.36	24.06
Rhepoxynius vigitegus	16	100.00	55.56	33.48
Foxiphalus major	10	66.67	34.72	43.37
Pagurus spp.	2	33.33	6.94	12.03
Pinnixa spp.	1	33.33	3.47	6.01

Appendix Table 3.--Continued.

Station no.: T-2-6 (continued) Date: 25 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Cancer magister	1	33.33	3.47	6.01
Crab larvae (zoeae)	1	33.33	3.47	6.01
Amphiodia spp.	3	100.00	10.42	0.00
Unid. sea cucumber	1	33.33	3.47	6.01

No. of taxa= 49

Mean no./sample: 444.00 SD: 180.30

Mean no./m^2: 4,625.00 SD/m^2: 1,878.12

H'= 3.14 SDV= 0.76 SR= 6.67 J= 0.56

Appendix Table 3.--Continued.

Station no.: T-3-1 Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Nemertinea	4	33.33	13.89	24.06
Scoloplos armiger	38	100.00	131.94	51.38
Aricidea suecica	4	66.67	13.89	12.03
Paraonella platybranchia	3	66.67	10.42	10.42
Minuspio cirrifera	1	33.33	3.47	6.01
Spiophanes bombyx	69	100.00	239.58	105.72
Megelona sacculata	16	100.00	55.56	6.01
Chaetozone setosa	81	100.00	281.25	75.12
Notomastus lineatus	3	66.67	10.42	10.42
Ophelia limacina	2	66.67	6.94	6.01
Eteone fauchaldi	1	33.33	3.47	6.01
Thalenessa spinosa	8	100.00	27.78	12.03
Streptosyllis sp.	1	33.33	3.47	6.01
Glycera convoluta	1	33.33	3.47	6.01
Nephtys caecoides	13	100.00	45.14	24.06
Onuphis elegans	1	33.33	3.47	6.01
Owenia fusiformis	4	66.67	13.89	12.03
Olivella pycna	12	100.00	41.67	10.42
Macoma expansa	1	33.33	3.47	6.01
Tellina modesta	6	66.67	20.83	20.83
Tellina nuculoides	1	33.33	3.47	6.01
Siliqua sloati	6	33.33	20.83	36.08
Cirripedia larvae	3	66.67	10.42	10.42
Neomysis kadiakensis	3	66.67	10.42	10.42
Anchicolurus occidentalis	9	100.00	31.25	18.04
Diastylopsis dawsoni	3	66.67	10.42	10.42
Hemilamprops californica	1	33.33	3.47	6.01
Leucon subnasica	5	66.67	17.36	15.91
Bathycopea daltonae	3	66.67	10.42	10.42
Eohaustorius sencillus	72	100.00	250.00	99.37
Eohaustorius washingtonianu	1	33.33	3.47	6.01
Monoculodes spinipes	2	33.33	6.94	12.03
Synchelidium shoemakeri	1	33.33	3.47	6.01
Corophium spinicorne	2	66.67	6.94	6.01
Photis macinerneyi	10	66.67	34.72	31.82
Ischyroceridae	2	33.33	6.94	12.03
Mandibulophoxus gelesi	47	100.00	163.19	86.74
Rhepoxynius vigitegus	34	100.00	118.06	36.58
Foxiphalus major	14	66.67	48.61	42.10
Talitroidea amphipod (unid.)	1	33.33	3.47	6.01
Pagurus spp.	1	33.33	3.47	6.01
Cancer spp. megalops	1	33.33	3.47	6.01
Amphiodia spp.	10	100.00	34.72	33.48
Dendraster excentricus	1	33.33	3.47	6.01

Appendix Table 3.--Continued.

Station no.: T-3-1 (continued) Date: 26 Jul 85 Sample size: 3

No. of taxa= 44

Mean no./sample: 167.33 SD: 37.23

Mean no./m^2: 1,743.06 SD/m^2: 387.85

H'= 4.10 SDV= 0.91 SR= 6.91 J= 0.75

Appendix Table 3.--Continued.

Station no.: T-3-2 Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Nemertinea	8	100.00	27.78	15.91
Scoloplos armiger	36	100.00	125.00	0.00
Aricidea suecica	6	66.67	20.83	27.56
Paraonella platybranchia	3	100.00	10.42	0.00
Spio filicornis	1	33.33	3.47	6.01
Spiophanes bombyx	41	100.00	142.36	39.44
Megelona sacculata	19	100.00	65.97	21.68
Chaetozone setosa	44	100.00	152.78	39.44
Notomastus lineatus	3	33.33	10.42	18.04
Thalenessa spinosa	10	100.00	34.72	15.91
Hesionidae (sp. B)	1	33.33	3.47	6.01
Streptosyllis sp.	1	33.33	3.47	6.01
Glycera convoluta	1	33.33	3.47	6.01
Glycinde armigera	1	33.33	3.47	6.01
Nephtys caecoides	7	100.00	24.31	15.91
Nephtys longosetosa	1	33.33	3.47	6.01
Onuphis elegans	2	66.67	6.94	6.01
Myriochele heeri	1	33.33	3.47	6.01
Owenia fusiformis	1	33.33	3.47	6.01
Ampharete acutifrons	1	33.33	3.47	6.01
Amaeana occidentalis	4	33.33	13.89	24.06
Olivella pycna	9	100.00	31.25	10.42
Mactra/Spisula spp.	1	33.33	3.47	6.01
Tellina modesta	9	100.00	31.25	10.42
Tellina nuculoides	1	33.33	3.47	6.01
Siliqua sloati	1	33.33	3.47	6.01
Anchicolurus occidentalis	5	100.00	17.36	6.01
Diastylopsis spp.	3	66.67	10.42	10.42
Diastylopsis dawsoni	1	33.33	3.47	6.01
Diastylopsis tenuis	2	66.67	6.94	6.01
Hemilamprops californica	1	33.33	3.47	6.01
Leucon subnasica	1	33.33	3.47	6.01
Bathycopea daltonae	2	33.33	6.94	12.03
Ampelisca macrocephala	3	33.33	10.42	18.04
Eohaustorius estuarius	4	66.67	13.89	15.91
Eohaustorius sencillus	53	100.00	184.03	36.58
Monoculodes spinipes	2	66.67	6.94	6.01
Corophium salmonis	1	33.33	3.47	6.01
Photis macinerneyi	3	100.00	10.42	0.00
Mandibulophoxus gelesi	40	100.00	138.89	59.23
Rhepoxynius abronius	1	33.33	3.47	6.01
Rhepoxynius vigitegus	48	100.00	166.67	126.30
Foxiphalus major	18	100.00	62.50	27.56
Decapoda zoeae	4	66.67	13.89	15.91
Pagurus spp.	5	66.67	17.36	21.68

Appendix Table 3.--Continued.

Station no.: T-3-2 (continued) Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Amphiodia spp.	11	100.00	38.19	31.82

No. of taxa= 46

Mean no./sample: 140.33 SD: 25.72

Mean no./m^2: 1,461.81 SD/m^2: 267.88

H'= 4.32 SDV= 0.93 SR= 7.45 J= 0.78

Appendix Table 3.--Continued.

Station no.: T-3-3 Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Nemertinea	6	66.67	20.83	20.83
Scoloplos armiger	37	100.00	128.47	12.03
Aricidea suecica	2	33.33	6.94	12.03
Paraonella platybranchia	1	33.33	3.47	6.01
Spiophanes bombyx	28	100.00	97.22	36.58
Megelona sacculata	43	100.00	149.31	21.68
Chaetozone setosa	49	100.00	170.14	59.23
Heteromastus filiformis	1	33.33	3.47	6.01
Notomastus lineatus	5	66.67	17.36	21.68
Ophelia limacina	1	33.33	3.47	6.01
Eteone fauchaldi	1	33.33	3.47	6.01
Thalenessa spinosa	5	100.00	17.36	12.03
Paleanotus bellis	1	33.33	3.47	6.01
Hesionidae (sp. B)	1	33.33	3.47	6.01
Streptosyllis sp.	1	33.33	3.47	6.01
Glycera convoluta	2	66.67	6.94	6.01
Glycinde armigera	1	33.33	3.47	6.01
Nephtys caecoides	7	100.00	24.31	12.03
Owenia fusiformis	11	100.00	38.19	6.01
Amaeana occidentalis	2	33.33	6.94	12.03
Nassarius fossatus	1	33.33	3.47	6.01
Olivella pycna	8	100.00	27.78	12.03
Aglaja diomedea	1	33.33	3.47	6.01
Mactra/Spisula spp.	1	33.33	3.47	6.01
Modiolus spp.	2	66.67	6.94	6.01
Macoma expansa	2	33.33	6.94	12.03
Tellina modesta	17	100.00	59.03	6.01
Tellina nuculoides	2	66.67	6.94	6.01
Siliqua sloati	2	66.67	6.94	6.01
Anchicolurus occidentalis	3	100.00	10.42	0.00
Diastylopsis sp. B	1	33.33	3.47	6.01
Leucon subnasica	3	33.33	10.42	18.04
Bathycopea daltonae	3	66.67	10.42	10.42
Ampelisca macrocephala	12	100.00	41.67	36.08
Eohaustorius estuarius	2	66.67	6.94	6.01
Eohaustorius sencillus	50	100.00	173.61	63.65
Monoculodes spinipes	2	33.33	6.94	12.03
Photis macinerneyi	6	66.67	20.83	20.83
Mandibulophoxus gelesi	39	100.00	135.42	37.56
Rhepoxynius abronius	7	100.00	24.31	15.91
Rhepoxynius vigitegus	35	100.00	121.53	26.21
Foxiphalus major	39	100.00	135.42	36.08
Tanais sp.	1	33.33	3.47	6.01
Shrimp larvae	5	33.33	17.36	30.07
Pagurus spp.	2	33.33	6.94	12.03

Appendix Table 3.--Continued.

Station no.: T-3-3 (continued) Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Amphiodia spp.	27	100.00	93.75	10.42
Amphiodia urtica	1	33.33	3.47	6.01
Holothuroidea	1	33.33	3.47	6.01

No. of taxa= 48

Mean no./sample: 160.00 SD: 7.21

Mean no./m^2: 1,666.67 SD/m^2: 75.12

H'= 4.42 SDV= 0.94 SR= 7.61 J= 0.79

Appendix Table 3.--Continued.

Station no.: T-3-4 Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	2	33.33	6.94	12.03
Nemertinea	6	100.00	20.83	10.42
Leitoscoloplos pugettensis	1	33.33	3.47	6.01
Naineris uncinata	1	33.33	3.47	6.01
Scoloplos armiger	84	100.00	291.67	140.14
Aricidea suecica	3	66.67	10.42	10.42
Paraonella platybranchia	2	66.67	6.94	6.01
Minuspio cirrifera	1	33.33	3.47	6.01
Spio filicornis	2	66.67	6.94	6.01
Spiophanes berkeleyorum	1	33.33	3.47	6.01
Spiophanes bombyx	182	100.00	631.94	108.42
Megelona sacculata	38	100.00	131.94	21.68
Chaetozone setosa	51	100.00	177.08	75.12
Notomastus lineatus	5	66.67	17.36	15.91
Thalenessa spinosa	2	33.33	6.94	12.03
Streptosyllis sp.	3	66.67	10.42	10.42
Glycera capitata	1	33.33	3.47	6.01
Glycera convoluta	2	33.33	6.94	12.03
Nephtys caecoides	10	100.00	34.72	15.91
Onuphis elegans	3	33.33	10.42	18.04
Myriochele heeri	1	33.33	3.47	6.01
Owenia fusiformis	708	100.00	2,458.33	2,554.51
Amaeana occidentalis	2	33.33	6.94	12.03
Mitrella gouldii	1	33.33	3.47	6.01
Nassarius fossatus	1	33.33	3.47	6.01
Olivella pycna	18	100.00	62.50	63.36
Mactra/Spisula spp.	6	66.67	20.83	27.56
Modiolus spp.	8	33.33	27.78	48.11
Clinocardium nuttalli	1	33.33	3.47	6.01
Macoma expansa	1	33.33	3.47	6.01
Tellina modesta	17	100.00	59.03	42.10
Siliqua spp.	3	33.33	10.42	18.04
Siliqua sloati	3	66.67	10.42	10.42
Ostracoda sp. A	1	33.33	3.47	6.01
Anchicolurus occidentalis	29	100.00	100.69	57.37
Diastylopsis dawsoni	18	100.00	62.50	27.56
Diastylopsis tenuis	2	66.67	6.94	6.01
Edotea sublittoralis	5	33.33	17.36	30.07
Synidotea bicuspida	10	66.67	34.72	51.38
Bathycopea daltonae	1	33.33	3.47	6.01
Ampelisca macrocephala	9	100.00	31.25	27.56
Eohaustorius estuarius	4	66.67	13.89	15.91
Eohaustorius sencillus	33	100.00	114.58	68.31
Monoculodes spinipes	2	33.33	6.94	12.03
Photis macinerneyi	25	100.00	86.81	105.37

Appendix Table 3.--Continued.

Station no.: T-3-4 (continued) Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Cheirimedeia macrocarpa	1	33.33	3.47	6.01
Ischyroceridae	2	33.33	6.94	12.03
Mandibulophoxus gelesi	2	66.67	6.94	6.01
Rhepoxynius abronius	3	33.33	10.42	18.04
Rhepoxynius vigitegus	15	100.00	52.08	27.56
Foxiphalus major	59	100.00	204.86	67.78
Tanais sp.	4	66.67	13.89	12.03
Shrimp larvae	2	33.33	6.94	12.03
Cancer magister	1	33.33	3.47	6.01
Crab larvae (zoeae)	2	33.33	6.94	12.03
Amphiodia spp.	21	100.00	72.92	36.08

No. of taxa= 56

Mean no./sample: 473.67 SD: 318.22

Mean no./m^2: 4,934.03 SD/m^2: 3,314.80

H'= 3.10 SDV= 0.73 SR= 7.58 J= 0.53

Appendix Table 3.--Continued.

Station no.: T-3-5 Date: 27 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	3	66.67	10.42	10.42
Nemertinea	10	100.00	34.72	21.68
Cerabratulus spp.	1	33.33	3.47	6.01
Naineris uncinata	2	66.67	6.94	6.01
Scoloplos armiger	22	100.00	76.39	39.44
Aricidea suecica	1	33.33	3.47	6.01
Paraonella platybranchia	2	66.67	6.94	6.01
Spiophanes bombyx	147	100.00	510.42	99.37
Megelona sacculata	31	100.00	107.64	84.20
Chaetozone setosa	28	100.00	97.22	42.10
Heteromastus filiformis	2	33.33	6.94	12.03
Notomastus lineatus	12	66.67	41.67	41.67
Thalenessa spinosa	3	66.67	10.42	10.42
Hesionidae?	2	66.67	6.94	6.01
Unidentified Syllidae	1	33.33	3.47	6.01
Glycinde spp.	1	33.33	3.47	6.01
Glycinde armigera	5	66.67	17.36	15.91
Nephtys caecoides	11	100.00	38.19	15.91
Onuphis elegans	2	66.67	6.94	6.01
Lumbrineris spp.	1	33.33	3.47	6.01
Owenia fusiformis	125	100.00	434.03	241.24
Ampharete acutifrons	2	33.33	6.94	12.03
Amaeana occidentalis	1	33.33	3.47	6.01
Mitrella gouldii	3	66.67	10.42	10.42
Olivella pycna	26	100.00	90.28	53.45
Mactra/Spisula spp.	1	33.33	3.47	6.01
Modiolus spp.	1	33.33	3.47	6.01
Macoma expansa	1	33.33	3.47	6.01
Tellina modesta	10	100.00	34.72	15.91
Siliqua sloati	2	33.33	6.94	12.03
Ostracoda sp. A	2	33.33	6.94	12.03
Anchicolurus occidentalis	4	66.67	13.89	15.91
Diastylopsis spp.	2	33.33	6.94	12.03
Diastylopsis dawsoni	49	100.00	170.14	123.40
Diastylopsis tenuis	1	33.33	3.47	6.01
Hemilamprops californica	2	66.67	6.94	6.01
Synidotea bicuspida	1	33.33	3.47	6.01
Ampelisca agassizi	4	33.33	13.89	24.06
Ampelisca macrocephala	26	100.00	90.28	52.43
Eohaustorius estuarius	20	100.00	69.44	66.97
Eohaustorius sencillus	55	100.00	190.97	78.87
Monoculodes spinipes	1	33.33	3.47	6.01
Photis macinerneyi	3	100.00	10.42	0.00
Cheirimedeia macrocarpa	6	100.00	20.83	18.04
Rhepoxynius abronius	17	100.00	59.03	12.03

Appendix Table 3.--Continued.

Station no.: T-3-5 (continued) Date: 27 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Rhepoxynius vigitegus	13	100.00	45.14	21.68
Foxiphalus major	14	100.00	48.61	31.82
Shrimp larvae	1	33.33	3.47	6.01
Amphiodia spp.	6	66.67	20.83	27.56

No. of taxa= 49

Mean no./sample: 228.67 SD: 10.02

Mean no./m^2: 2,381.94 SD/m^2: 104.34

H'= 4.09 SDV= 0.90 SR= 7.35 J= 0.73

Appendix Table 3.--Continued.

Station no.: T-3-6 Date: 27 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	2	33.33	6.94	12.03
Nemertinea	5	100.00	17.36	6.01
Cerabratulus spp.	1	33.33	3.47	6.01
Leitoscoloplos pugettensis	2	33.33	6.94	12.03
Scoloplos armiger	23	100.00	79.86	21.68
Aricidea suecica	1	33.33	3.47	6.01
Spiophanes bombyx	91	100.00	315.97	151.07
Megelona sacculata	19	100.00	65.97	33.48
Chaetozone setosa	31	100.00	107.64	73.16
Notomastus lineatus	4	100.00	13.89	6.01
Thalenessa spinosa	2	33.33	6.94	12.03
Streptosyllis sp.	1	33.33	3.47	6.01
Glycinde armigera	1	33.33	3.47	6.01
Nephtys caecoides	7	100.00	24.31	15.91
Onuphis elegans	1	33.33	3.47	6.01
Myriochele heeri	2	66.67	6.94	6.01
Owenia fusiformis	175	100.00	607.64	469.60
Ampharete acutifrons	2	33.33	6.94	12.03
Mitrella gouldii	2	66.67	6.94	6.01
Olivella pycna	46	100.00	159.72	98.45
Mactra/Spisula spp.	1	33.33	3.47	6.01
Modiolus spp.	1	33.33	3.47	6.01
Tellina modesta	11	66.67	38.19	42.10
Anchicolurus occidentalis	3	66.67	10.42	10.42
Diastylopsis dawsoni	28	100.00	97.22	24.06
Leucon subnasica	1	33.33	3.47	6.01
Edotea sublittoralis	1	33.33	3.47	6.01
Synidotea bicuspida	8	100.00	27.78	15.91
Gnorimophaeroma spp.	1	33.33	3.47	6.01
Ampelisca macrocephala	1	33.33	3.47	6.01
Eohaustorius estuarius	6	66.67	20.83	18.04
Eohaustorius sencillus	13	100.00	45.14	12.03
Photis macinerneyi	4	66.67	13.89	12.03
Cheirimedeia macrocarpa	1	33.33	3.47	6.01
Rhepoxynius abronius	12	100.00	41.67	36.08
Rhepoxynius vigitegus	13	100.00	45.14	33.48
Foxiphalus major	13	100.00	45.14	15.91
Tanais sp.	2	33.33	6.94	12.03
Pagurus spp.	1	33.33	3.47	6.01
Cancer magister	1	33.33	3.47	6.01
Amphiodia spp.	5	100.00	17.36	6.01
Dendraster excentricus	1	33.33	3.47	6.01

Appendix Table 3.--Continued.

Station no.: T-3-6 (continued) Date: 27 Jul 85 Sample size: 3

No. of taxa= 42

Mean no./sample: 182.00 SD: 81.26

Mean no./m^2: 1,895.83 SD/m^2: 846.51

H'= 3.66 SDV= 0.85 SR= 6.51 J= 0.68

Appendix Table 3.--Continued.

Station no.: T-4-1 Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	2	66.67	6.94	6.01
Nemertinea	9	100.00	31.25	18.04
Scoloplos armiger	30	100.00	104.17	72.92
Aricidea suecica	5	100.00	17.36	12.03
Paraonella platybranchia	1	33.33	3.47	6.01
Spiophanes bombyx	249	100.00	864.58	559.31
Megelona sacculata	16	100.00	55.56	26.21
Chaetozone setosa	57	100.00	197.92	52.08
Thalenessa spinosa	8	100.00	27.78	15.91
Glycera convoluta	1	33.33	3.47	6.01
Glycinde armigera	1	33.33	3.47	6.01
Nephtys caecoides	7	100.00	24.31	6.01
Myriochele heeri	1	33.33	3.47	6.01
Owenia fusiformis	18	100.00	62.50	90.21
Olivella pycna	4	100.00	13.89	6.01
Mactra/Spisula spp.	2	66.67	6.94	6.01
Macoma expansa	6	66.67	20.83	20.83
Tellina modesta	9	66.67	31.25	31.25
Tellina nuculoides	4	33.33	13.89	24.06
Siliqua sloati	11	66.67	38.19	57.37
Archeomysis grebnitzkii	1	33.33	3.47	6.01
Anchicolurus occidentalis	2	66.67	6.94	6.01
Diastylopsis dawsoni	2	33.33	6.94	12.03
Diastylopsis tenuis	2	66.67	6.94	6.01
Hemilamprops californica	1	33.33	3.47	6.01
Leucon subnasica	1	33.33	3.47	6.01
Edotea sublittoralis	3	33.33	10.42	18.04
Eohaustorius estuarius	1	33.33	3.47	6.01
Eohaustorius sencillus	73	100.00	253.47	42.10
Psammonyx longimerus	1	33.33	3.47	6.01
Monoculodes spinipes	3	66.67	10.42	10.42
Photis macinerneyi	5	100.00	17.36	12.03
Mandibulophoxus gelesi	40	100.00	138.89	109.42
Rhepoxynius vigitegus	17	100.00	59.03	15.91
Foxiphalus major	12	100.00	41.67	18.04
Pagurus spp.	2	33.33	6.94	12.03
Cancer magister	1	33.33	3.47	6.01
Crab larvae (zoeae)	2	66.67	6.94	6.01
Amphiodia spp.	11	100.00	38.19	12.03

Appendix Table 3.--Continued.

Station no.: T-4-1 (continued) Date: 26 Jul 85 Sample size: 3

No. of taxa= 39

Mean no./sample: 207.00 SD: 83.23

Mean no./m^2: 2,156.25 SD/m^2: 867.03

H'= 3.43 SDV= 0.81 SR= 5.91 J= 0.65

Appendix Table 3.--Continued.

Station no.: T-4-2 Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	5	66.67	17.36	21.68
Nemertinea	19	100.00	65.97	60.14
Polychaeta	1	33.33	3.47	6.01
Polychaete larvae	7	66.67	24.31	33.48
Scoloplos armiger	5	100.00	17.36	12.03
Minuspio cirrifera	7	100.00	24.31	15.91
Spiophanes bombyx	439	100.00	1,524.31	926.46
Megelona sacculata	10	100.00	34.72	26.21
Chaetozone setosa	5	66.67	17.36	21.68
Unid. Maldanidae	1	33.33	3.47	6.01
Ophelia limacina	4	66.67	13.89	12.03
Anaitides hartmanae	1	33.33	3.47	6.01
Thalenessa spinosa	2	66.67	6.94	6.01
Hesionidae?	2	33.33	6.94	12.03
Hesionidae (sp. C)	3	33.33	10.42	18.04
Glycinde spp.	16	66.67	55.56	57.37
Glycinde armigera	3	66.67	10.42	10.42
Nephtys caecoides	10	100.00	34.72	33.48
Onuphis elegans	4	100.00	13.89	6.01
Onuphis spp.	6	100.00	20.83	10.42
Lumbrineris bicirrata	1	33.33	3.47	6.01
Myriochele heeri	77	100.00	267.36	62.79
Owenia fusiformis	9,546	100.00	33,145.83	8,083.15
Ampharete acutifrons	4	100.00	13.89	6.01
Mitrella gouldii	1	33.33	3.47	6.01
Olivella pycna	4	33.33	13.89	24.06
Cyclostremella spp.	10	66.67	34.72	51.38
Modiolus spp.	379	100.00	1,315.97	367.01
Macoma expansa	13	100.00	45.14	43.37
Tellina modesta	44	100.00	152.78	48.11
Siliqua sloati	412	100.00	1,430.56	1,110.50
Pandora spp.	1	33.33	3.47	6.01
Harpacticoida	1	33.33	3.47	6.01
Ostracoda sp. A	1	33.33	3.47	6.01
Neomysis kadiakensis	2	66.67	6.94	6.01
Acanthomysis macropsis	1	33.33	3.47	6.01
Anchicolurus occidentalis	92	100.00	319.44	431.55
Diasylis alaskensis	1	33.33	3.47	6.01
Diastylopsis dawsoni	878	100.00	3,048.61	3,989.82
Hemilamprops californica	1	33.33	3.47	6.01
Leucon subnasica	50	100.00	173.61	76.78
Edotea sublittoralis	9	100.00	31.25	18.04
Synidotea bicuspida	19	100.00	65.97	78.18
Ianiropsis kincaidi	1	33.33	3.47	6.01
Ampelisca macrocephala	2	66.67	6.94	6.01

Appendix Table 3.--Continued.

Station no.: T-4-2 (continued) Date: 26 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Atylus tridens	1	33.33	3.47	6.01
Eohaustorius estuarius	1	33.33	3.47	6.01
Eohaustorius sencillus	9	66.67	31.25	27.56
Monoculodes spinipes	4	33.33	13.89	24.06
Synchelidium shoemakeri	1	33.33	3.47	6.01
Corophium spinicorne	2	33.33	6.94	12.03
Photis macinerneyi	85	100.00	295.14	223.49
Cheirimedeia macrocarpa	8	66.67	27.78	26.21
Ischyroceridae	60	100.00	208.33	167.64
Mandibulophoxus gelesi	2	33.33	6.94	12.03
Rhepoxynius vigitegus	6	66.67	20.83	20.83
Foxiphalus major	14	66.67	48.61	52.43
Caprellidae	2	66.67	6.94	6.01
Tanais sp.	1	33.33	3.47	6.01
Lissocrangon stylirostris	1	33.33	3.47	6.01
Cancer magister	2	33.33	6.94	12.03
Crab larvae (zoeae)	2	66.67	6.94	6.01
Cancer spp. megalops	2	33.33	6.94	12.03
Amphiodia spp.	5	66.67	17.36	15.91
Dendraster excentricus	2	33.33	6.94	12.03

No. of taxa= 65

Mean no./sample: 4,103.33 SD: 879.16

Mean no./m^2: 42,743.06 SD/m^2: 9,157.90

H'= 1.51 SDV= 0.39 SR= 6.80 J= 0.25

Appendix Table 3.--Continued.

Station no.: T-4-3 Date: 27 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	5	33.33	17.36	30.07
Nemertinea	12	66.67	41.67	37.56
Polychaete larvae	2	33.33	6.94	12.03
Scoloplos armiger	7	100.00	24.31	15.91
Minuspio cirrifera	2	66.67	6.94	6.01
Spiophanes bombyx	585	100.00	2,031.25	385.42
Megelona sacculata	16	100.00	55.56	36.58
Chaetozone setosa	6	100.00	20.83	10.42
Tharyx spp.	1	33.33	3.47	6.01
Capitella capitata	3	66.67	10.42	10.42
Heteromastus filiformis	2	66.67	6.94	6.01
Notomastus lineatus	4	66.67	13.89	15.91
Armandia brevis	1	33.33	3.47	6.01
Anaitides groenlandica	1	33.33	3.47	6.01
Anaitides spp.	1	33.33	3.47	6.01
Eteone fauchaldi	4	33.33	13.89	24.06
Eteone spp.	2	33.33	6.94	12.03
Thalenessa spinosa	4	66.67	13.89	15.91
Hesionidae?	1	33.33	3.47	6.01
Glycera convoluta	1	33.33	3.47	6.01
Glycinde spp.	7	33.33	24.31	42.10
Glycinde armigera	9	100.00	31.25	27.56
Nephtys caecoides	2	66.67	6.94	6.01
Nephtys spp.	6	33.33	20.83	36.08
Onuphis elegans	9	100.00	31.25	18.04
Onuphis spp.	2	33.33	6.94	12.03
Lumbrineris bicirrata	2	66.67	6.94	6.01
Myriochele heeri	50	100.00	173.61	122.07
Owenia fusiformis	5,905	100.00	20,503.47	13,710.73
Amaeana occidentalis	3	66.67	10.42	10.42
Archiannelida	4	33.33	13.89	24.06
Mitrella gouldii	2	33.33	6.94	12.03
Nassarius fossatus	3	66.67	10.42	10.42
Olivella pycna	48	66.67	166.67	236.62
Cyclostremella spp.	3	66.67	10.42	10.42
Cylichna attonsa	1	33.33	3.47	6.01
Mactra/Spisula spp.	8	66.67	27.78	26.21
Modiolus spp.	65	100.00	225.69	320.27
Macoma expansa	11	66.67	38.19	49.23
Macoma spp.	1	33.33	3.47	6.01
Tellina modesta	23	100.00	79.86	26.21
Siliqua sloati	273	66.67	947.92	1,596.95
Ostracoda sp. A	3	66.67	10.42	10.42
Anchicolurus occidentalis	25	100.00	86.81	88.59
Diastylopsis spp.	6	33.33	20.83	36.08

Appendix Table 3.--Continued.

Station no.: T-4-3 (continued) Date: 27 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Diastylopsis dawsoni	40	100.00	138.89	222.52
Diastylopsis tenuis	2	33.33	6.94	12.03
Leucon subnasica	27	66.67	93.75	153.45
Edotea sublittoralis	1	33.33	3.47	6.01
Synidotea bicuspida	7	66.67	24.31	26.21
Ianiropsis kincaidi	1	33.33	3.47	6.01
Bathycopea daltonae	2	33.33	6.94	12.03
Ampelisca macrocephala	6	66.67	20.83	27.56
Eohaustorius estuarius	15	66.67	52.08	72.92
Eohaustorius sencillus	13	100.00	45.14	15.91
Monoculodes spinipes	2	33.33	6.94	12.03
Synchelidium shoemakeri	1	33.33	3.47	6.01
Corophium spp.	1	33.33	3.47	6.01
Corophium spinicorne	1	33.33	3.47	6.01
Photis brevipes	1	33.33	3.47	6.01
Photis macinerneyi	58	100.00	201.39	131.07
Cheirimedeia macrocarpa	17	100.00	59.03	33.48
Ischyroceridae	20	100.00	69.44	69.36
Dyopedos arcticus	2	33.33	6.94	12.03
Rhepoxynius abronius	16	100.00	55.56	26.21
Rhepoxynius vigitegus	24	100.00	83.33	45.41
Foxiphalus major	2	33.33	6.94	12.03
Caprellidae	3	33.33	10.42	18.04
Tanais sp.	2	66.67	6.94	6.01
Porcellanid crab	1	33.33	3.47	6.01
Cancer spp.	1	33.33	3.47	6.01
Amphiodia spp.	13	100.00	45.14	60.14
Unid. sea cucumber	1	33.33	3.47	6.01

No. of taxa= 73

Mean no./sample: 2,470.33 SD: 1,616.68

Mean no./m^2: 25,732.64 SD/m^2: 16,840.47

H'= 1.48 SDV= 0.36 SR= 8.08 J= 0.24

Appendix Table 3.--Continued.

Station no.: T-4-4 Date: 27 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Anthozoa	4	66.67	13.89	12.03
Nemertinea	10	100.00	34.72	15.91
Polychaete larvae	2	33.33	6.94	12.03
Leitoscoloplos pugettensis	3	100.00	10.42	0.00
Scoloplos armiger	6	100.00	20.83	10.42
Minuspio cirrifera	6	100.00	20.83	10.42
Spio filicornis	1	33.33	3.47	6.01
Spiophanes bombyx	265	100.00	920.14	789.91
Megelona sacculata	7	100.00	24.31	12.03
Chaetozone setosa	10	100.00	34.72	6.01
Capitella capitata	1	33.33	3.47	6.01
Notomastus lineatus	1	33.33	3.47	6.01
Armandia brevis	3	66.67	10.42	10.42
Anaitides hartmanae	1	33.33	3.47	6.01
Anaitides spp.	1	33.33	3.47	6.01
Thalenessa spinosa	4	100.00	13.89	6.01
Paleanotus bellis	1	33.33	3.47	6.01
Hesionidae?	2	33.33	6.94	12.03
Syllis sp.	1	33.33	3.47	6.01
Streptosyllis sp.	1	33.33	3.47	6.01
Glycinde spp.	2	33.33	6.94	12.03
Glycinde armigera	7	100.00	24.31	6.01
Nephtys caecoides	8	100.00	27.78	15.91
Nephtys californiensis	1	33.33	3.47	6.01
Nephtys spp.	7	33.33	24.31	42.10
Onuphis elegans	28	100.00	97.22	66.97
Onuphis spp.	4	100.00	13.89	6.01
Lumbrineris bicirrata	3	66.67	10.42	10.42
Myriochele heeri	40	66.67	138.89	120.73
Owenia fusiformis	6,304	100.00	21,888.89	7,575.15
Amaeana occidentalis	3	66.67	10.42	10.42
Mitrella gouldii	4	66.67	13.89	15.91
Olivella biplicata	2	33.33	6.94	12.03
Olivella pycna	5	66.67	17.36	21.68
Cyclostremella spp.	13	66.67	45.14	61.04
Mactra/Spisula spp.	18	100.00	62.50	63.36
Modiolus spp.	113	100.00	392.36	302.14
Clinocardium nuttalli	1	33.33	3.47	6.01
Macoma expansa	4	66.67	13.89	15.91
Tellina modesta	45	100.00	156.25	112.67
Tellina nuculoides	10	100.00	34.72	15.91
Siliqua sloati	78	100.00	270.83	190.09
Balanus spp.	1	33.33	3.47	6.01
Anchicolurus occidentalis	3	100.00	10.42	0.00
Diastylopsis spp.	53	100.00	184.03	151.07

Appendix Table 3.--Continued.

Station no.: T-4-4 (continued) Date: 27 Jul 85 Sample size: 3

Taxa	Total no.	Freq. of occur. (%)	Mean no./m^2	SD/m^2
Diastylopsis dawsoni	129	100.00	447.92	395.83
Leucon subnasica	28	100.00	97.22	108.42
Edotea sublittoralis	3	33.33	10.42	18.04
Synidotea bicuspida	3	66.67	10.42	10.42
Ampelisca agassizi	1	33.33	3.47	6.01
Ampelisca macrocephala	4	66.67	13.89	15.91
Megaluropus longimerus	1	33.33	3.47	6.01
Eohaustorius estuarius	11	66.67	38.19	49.23
Eohaustorius sencillus	10	100.00	34.72	33.48
Corophium spinicorne	5	100.00	17.36	6.01
Photis parvidens	4	66.67	13.89	15.91
Photis macinerneyi	55	100.00	190.97	52.43
Cheirimedeia macrocarpa	16	100.00	55.56	21.68
Ischyroceridae	19	100.00	65.97	61.04
Dyopedos arcticus	2	33.33	6.94	12.03
Rhepoxynius abronius	17	66.67	59.03	84.84
Rhepoxynius vigitegus	4	100.00	13.89	6.01
Foxiphalus major	6	66.67	20.83	20.83
Caprellidae	1	33.33	3.47	6.01
Lissocrangon stylirostris	1	33.33	3.47	6.01
Pinnixa spp.	1	33.33	3.47	6.01
Cancer magister	4	66.67	13.89	15.91
Amphiodia spp.	8	100.00	27.78	30.07
Sagitta spp.	1	33.33	3.47	6.01
Pycnogonidea	2	33.33	6.94	12.03
Achelia gracilipes	1	33.33	3.47	6.01

No. of taxa= 71

Mean no./sample: 2,474.67 SD: 822.08

Mean no./m^2: 25,777.78 SD/m^2: 8,563.29

H'= 1.27 SDV= 0.28 SR= 7.85 J= 0.21

Appendix Table 4.--Invertebrate and fish taxa found during the July 1985 benthic invertebrate and trawl survey off Tillamook Bay, Oregon. Species that could not be identified were designated by letter.

TAXA CAPTURED BY BOX CORER

Cnidaria
- Anthozoa

Nemertinea

Annelida
- Polychaeta
  - Orbiniidae
    - *Leitoscoloplos pugettensis* (Johnson 1910)
    - *Scoloplos armiger* (Muller 1776)
  - Paraonidae
    - *Aricidea suecica* (Elaison 1920)
    - *Paraonella platybranchia* (Hartman 1961)
  - Spionidae
    - *Minuspio cirrifera* (Wiren 1883)
    - *Spio filicornis* Muller 1776
    - *Spiophanes berkeleyorum* Pettibone 1962
    - *Spiophanes bombyx* (Claparede 1870)
  - Megelonidae
    - *Megelona sacculata* Hartman 1961
  - Chaetopteridae
  - Cirratulidae
    - *Chaetozone setosa* Malmgren 1867
    - *Tharyx* sp.
    - Cirratulidae sp. A
  - Capitellidae
    - *Capitella capitata* (Fabricius 1780)
    - *Heteromastus filiformis* (Claparede 1864)
    - *Notomastus lineatus* Claparede 1870
  - Maldanidae
    - *Axiothella rubrocincta* (Johnson 1901)
    - Maldanidae (unidentified)
  - Opheliidae
    - *Armandia brevis* Moore 1906
    - *Ophelia limacina* (Rathke 1843)
    - *Ophelia* spp.
  - Phyllodocidae
    - *Anaitides groenlandica* (Oersted 1843)
    - *Anaitides hartmanae* (Blake and Walton 1977)
    - *Anaitides* spp.

Appendix Table 4.--Continued.

- *Eteone fauchaldi* Kravitz and Jones 1979
- *Eteone* spp.
- Polynoidae
  - *Halosydna brevisetosa* Kinberg 1855
- Sigalionidae
  - *Thalenessa spinosa* (Hartman 1939)
- Chrysopetalidae
  - *Paleanotus bellis* (Johnson 1897)
- Hesionidae
  - Hesionidae sp. B
  - Hesionidae sp. C
  - *Podarkeopsis brevipalpa* (Hartman-Schroeder 1959)
- Syllidae
  - *Streptosyllis* spp.
  - *Syllis* spp.
  - *Trypanosyllis* spp.
- Nereidae
  - *Cheilonereis cyclurus* (Harrington 1897)
- Glyceridae
  - *Glycera capitata* Oersted 1843
  - *Glycera convoluta* Keferstein 1862
- Goniadidae
  - *Glycinde armigera* Moore 1911
  - *Glycinde* spp.
- Nephtyidae
  - *Nephtys caecoides* Hartman 1938
  - *Nephtys californiensis* Hartman 1938
  - *Nephtys longosetosa* Oersted 1843
  - *Nephtys* spp.
- Onuphidae
  - *Onuphis elegans* (Johnson 1901)
  - *Onuphis* spp.
- Lumbrineridae
  - *Lumbrineris bicirrata* Treadwell 1929
  - *Lumbrineris* spp.
- Oweniidae
  - *Myriochele heeri* Malmgren 1867
  - *Owenia fusiformis* delle Chiaje 1841
- Ampharetidae
  - *Ampharete acutifrons* (Grube 1860)
- Terebellidae
  - *Amaeane occidentalis* Hartman 1944

Archiannelida

Mollusca

- Gastropoda
  - Neogastropoda
    - Thaididae
      - *Nucella* sp.
    - Columbellidae
      - *Mitrella gouldii* (Carpenter 1856)

Appendix Table 4.--Continued.

Nassaridae
Nassarius fossatus (Gould 1850)

Nassarius mendicus (Gould 1850)
Olividae
Olivella baetica Marrat 1871
Olivella biplicata (Sowerby 1825)
Olivella pycna Berry 1935
Turridae
Mangelia spp.
Opistobranchia
Pyramidellidae
Odostomia spp.
Cyclostremellidae
Cyclostremella sp.
Cephalaspidae
Aglajidae
Aglaja diomedea (Bergh 1894)
Scaphandridae
Cylichna attonsa (Carpenter 1864)
Pelecypoda
Mytilidae
Modiolus spp.
Cardiidae
Clinocardium nuttali (Conrad 1883)
Mactridae
Mactra/Spisula spp. ?
Tellinidae
Macoma elimata Dunnill and Coan 1968
Macoma expansa Carpenter 1864
Macoma spp.
Tellina bodegensis Hinds 1845
Tellina modesta (Carpenter 1864)
Tellina nuculoides (Reeve 1854)
Solenidae
Siliqua spp.
Siliqua sloati Hertlein 1961
Pandoridae
Pandora spp.

Arthropoda
Pycnogonidea
Achelia gracilipes (Cole 1904)
Pycnogonidea (unidentified)
Crustacea
Ostracoda
Ostracoda sp. A
Copepoda
Harpacticoida
Cirripedia
Cirripedia larvae

Appendix Table 4.--Continued.

- Mysidacea
  - Mysidae
    - *Acanthomysis macropsis*
    - *Archaeomysis grebnitzkii* Czerniavsky 1882
    - *Neomysis kadiakensis* Ortmann 1908
  - Tanaidacea
    - *Tanais* spp.
- Cumacea
  - Colurostylidae
    - *Anchicolurus occidentalis* (Calman 1912)
  - Diastylidae
    - *Diastylis alaskensis* Calman 1912
    - *Diastylopsis dawsoni* Smith 1880
    - *Diastylopsis tenuis* Zimmer 1936
    - *Diastylopsis* sp. B
    - *Diastylopsis* spp.
  - Lampropidae
    - *Hemilamprops californica* Zimmer 1936
  - Leuconidae
    - *Leucon subnasica* Given 1961
- Isopoda
  - Idoteidae
    - *Edotea sublittoralis* Menzies and Barnard 1959
    - *Synidotea bicuspida* Owen 1939
  - Janiridae
    - *Ianiropsis kincaidi* Richardson 1904
  - Sphaeromatidae
    - *Bathycopea daltonae* Menzies and Barnard 1959
    - *Gnorimosphaeroma* spp.
- Amphipoda
  - Ampeliscidae
    - *Ampelisca agassizi* (Judd 1896)
    - *Ampelisca macrocephala* Liljeborg 1852
  - Atylidae
    - *Atylus tridens* (Alderman 1936)
  - Corophiidae
    - *Corophium salmonis* Stimpson 1857
    - *Corophium spinicorne* Stimpson 1857
    - *Corophium* spp.
  - Gammaridae
    - Gammarid (unidentified)
    - *Megaluropus longimerus* Schellenberg 1925
  - Haustoriidae
    - *Eohaustorius estuarius* Bosworth 1973
    - *Eohaustorius sencillus* Barnard 1962
    - *Eohaustorius washingtonianus* (Thorsteinson 1941)
    - *Eohaustorius* spp.
  - Isaeidae
    - *Cheirimedeia macrocarpa* Bulytscheva 1952
    - *Photis macinerneyi* Conlan 1983
    - *Photis parvidons* Conlan 1983
    - *Photis brevipes* Shoemaker 1942

Appendix Table 4.--Continued.

Ischyroceridae
Ischyrocerus spp.
Lysianassidae
Psammonyx longimerus Jarret and Bousfield 1982
Oedicerotidae
Monoculodes spinipes Mills 1962
Synchelidium shoemakeri Mills 1962
Phoxocephalidae
Foxiphalus major (Barnard 1960)
Foxiphalus obtusidens (Barnard 1960)
Mandibulophoxus gelesi (Giles 1890)
Rhepoxynius abronius (Barnard 1960)
Rhepoxynius tridentatus (Barnard 1954)
Rhepoxynius vigitegus (Barnard 1971)
Pleustidae
Parapleustes den Barnard 1969
Pleusymtes subglaber Barnard and Given 1960
Talitridae
Podoceridae
Dyopedos arcticus Murdock 1884
Caprellidae

Decapoda
Natantia
Shrimp larvae
Crangonidae
Crangon alaskensis Lockington 1887
Lissocrangon stylirostris (Holmes 1900)
Reptantia
Crab larvae (zoeae)
Callianassidae
Callianassa californiensis Dana 1854
Paguridae
Pagurus spp.
Pinnotheridae
Pinnixa spp.
Porcellanidae
Cancridae
Cancer magister Dana 1852
Cancer spp. (megalops)

Echinodermata
Ophiuroidea
Amphiodia spp.
Amphiodia urtica (Lyman 1860)
Echinoidea
Dendraster excentricus (Eschscholtz 1831)
Holothuroidea
Unidentified sea cucumber

Appendix Table 4.--Continued.

TAXA CAPTURED BY TRAWL

Common Name	Scientific Name
Big skate	*Raja binoculata*
Spotted ratfish	*Hydrolagus colliei*
Unidentified juvenile smelt	Osmeridae
Pacific tomcod	*Microgadus proximus*
Saddleback gunnel	*Pholis ornata*
Black rockfish	*Sebastes melanops*
Unidentified rockfish	Scorpaenidae
Kelp greenling	*Hexagrammos decagrammus*
Lingcod	*Ophiodon elongatus*
Pacific staghorn sculpin	*Leptocottus armatus*
Unidentified sculpin	Cottidae
Sturgeon poacher	*Agonus acipenserinus*
Warty poacher	*Ocella verrucosa*
Tubenose poacher	*Pallasina barbata*
Pricklebreast poacher	*Stellerina xyosterna*
Showy snailfish	*Liparis pulchellus*
Unidentified snailfish	Cyclopteridae
Speckled sanddab	*Citharichthys stigmaeus*
Butter sole	*Isopsetta isolepis*
English sole	*Parophrys vetulus*
Sand sole	*Psettichthys melanostictus*
Dungeness crab	*Cancer magister*