AN ECOLOGICAL CHARACTERIZATION OF INTERTIDAL RESOURCES OF ACADIA NATIONAL PARK: MACROFAUNA

By

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TABLE OF CONTENTS

INTRODUCTION

Acadia National Park is the second-most visited of our national parks. Central to this attraction is the exposure to the ocean which is experienced in a multitude of ways. Acadia, and the northern Gulf of Maine in general, are popular because of the widely held perception of high environmental quality in the Gulf of Maine and rapidly declining coastal environmental quality elsewhere. Evidence is accumulating, however, that shows that the Gulf of Maine is beginning to exhibit the classic symptoms of degradation associated with urbanization and industrialization. Severe degradation is limited to a few localities in the Gulf (for example Larsen et al. 1983, 1984, 1986; Johnson et al. 1985), but there is no place in the Gulf of Maine that is unaffected by man's activities. There is an urgent need for monitoring studies to survey the general state of the environment, and to provide information needed for meaningful resource protection and management.

The purpose of this project was to design and carry out just such a monitoring program for Acadia National Park in order to provide a benchmark of current conditions and facilitate the evaluation of changes related to non-catastrophic environmental alterations, i.e. long-term changes in sea-level and accumulation of toxic chemicals. Intertidal macrofaunal communities were chosen for the monitoring program because they consist primarily of easily sampled and identified non-motile species whose quantitative patterns of distribution in time and space serve to integrate environmental conditions. Species abundances and distributions will thus be expected to change in response to pollutants or changes in sea-level and/or inundation patterns. Two habitats were particularly well-suited for this study, the high-energy rocky shore and the low-energy intertidal mudflats, and our efforts were concentrated in those habitats. The occurrence and importance of these habitats along the Maine coast have been summarized in a series of publications by Larsen and others (Doggett et al., 1978; U.S. Fish and Wildlife Service, 1980; Larsen, 1981; Larsen and Doggett, 1981, 1985, 1991; Maine State Planning Office, 1983).

The sampling techniques required for each of the two habitats were quite different. Monitoring of the rocky intertidal was primarily photographic, because the habitat is essentially two-dimensional. Monitoring of the mudflat community, on the other hand, required taking core samples of the mud, sieving, removing and identifying the animals, a more labor-intensive process. In both cases we wanted to quantify the baseline abundance of the animals, and we looked for zonation in species distributions and for species with limited distributions which might serve as indicator species for changes in tidal range or elevation. Our effort was concentrated at the upper and lower extremes of the tidal range since that is where the species distributions should be most responsive to environmental changes. The purpose of the first year's work was to develop a monitoring protocol so that subsequent long-term sampling would have the best chance of revealing changes in the community. The second and third years of this study were designed to carry out this monitoring plan on a limited number of stations in

order to provide the benchmark for future studies. This will enable us to quantify the influence of any catastrophic events which might affect Acadia as well as to evaluate more subtle long-term changes which may occur.

SAMPLING PROTOCOL

Sample Locations

We chose four areas for sampling during our initial sampling trip to the Acadia National Park in October 1987, two mud flats and two rocky intertidal areas. Our criteria for selecting the mud flat sites were: 1) a wide geographical separation to increase the coverage within the Park; 2) no obvious existing impacts from man's activities; and 3) reasonable access to facilitate sampling. Our criteria for selecting the rocky intertidal sites were: 1) a range in the degree of wave exposure; and 2) presence of a relatively flat, vertical rock face to facilitate the photographic sampling. The sites we selected are indicated in Fig. 1, a map of the Park region; a brief description of each site follows:

Otter Cove This is a protected mudflat at the southern tip of Mount Desert Island (Fig. 1). The mudflat is located inside the causeway at Otter Cove; water exchanges freely through a culvert to the open ocean. We estimate that the volume of water remaining in the cove at low tide is less than 10% of the high tide volume. The mudflat is approximately 100 m wide at our sample site and is bordered by a relatively steep rocky shore.

The stations were located on a transect starting on the east side of the cove (Fig. 2) about 200 m along the shore at low tide from the center (lengthwise) of the causeway. The upper end of the transect was marked by a stainless steel bolt, drilled in and cemented to a rock ledge about 2 m high at the edge of the beach; the pin was located about 1 m up the face of the ledge. The transect was laid out perpendicular to the shoreline with the first station (High Intertidal) located 22 m from the pin toward the water and the second station (Low Intertidal) located 71 m further out into the cove. The High station was located on the shoreward edge of a small tidal creek that runs parallel to the shoreline and has 20 to 30 cm of water at low tide. The Low station was located at the low water line on the first sampling date.

Thompson Island This is a mudflat site located at the northern end of Mount Desert Island at the point where the island is connected to the mainland (Fig. 1). There is an open exchange of water with Mount Desert Narrows, the passage connecting the Eastern and Western Bays. The mudflat is approximately 175 m wide at our sample site and is bordered by a narrow band of salt marsh.

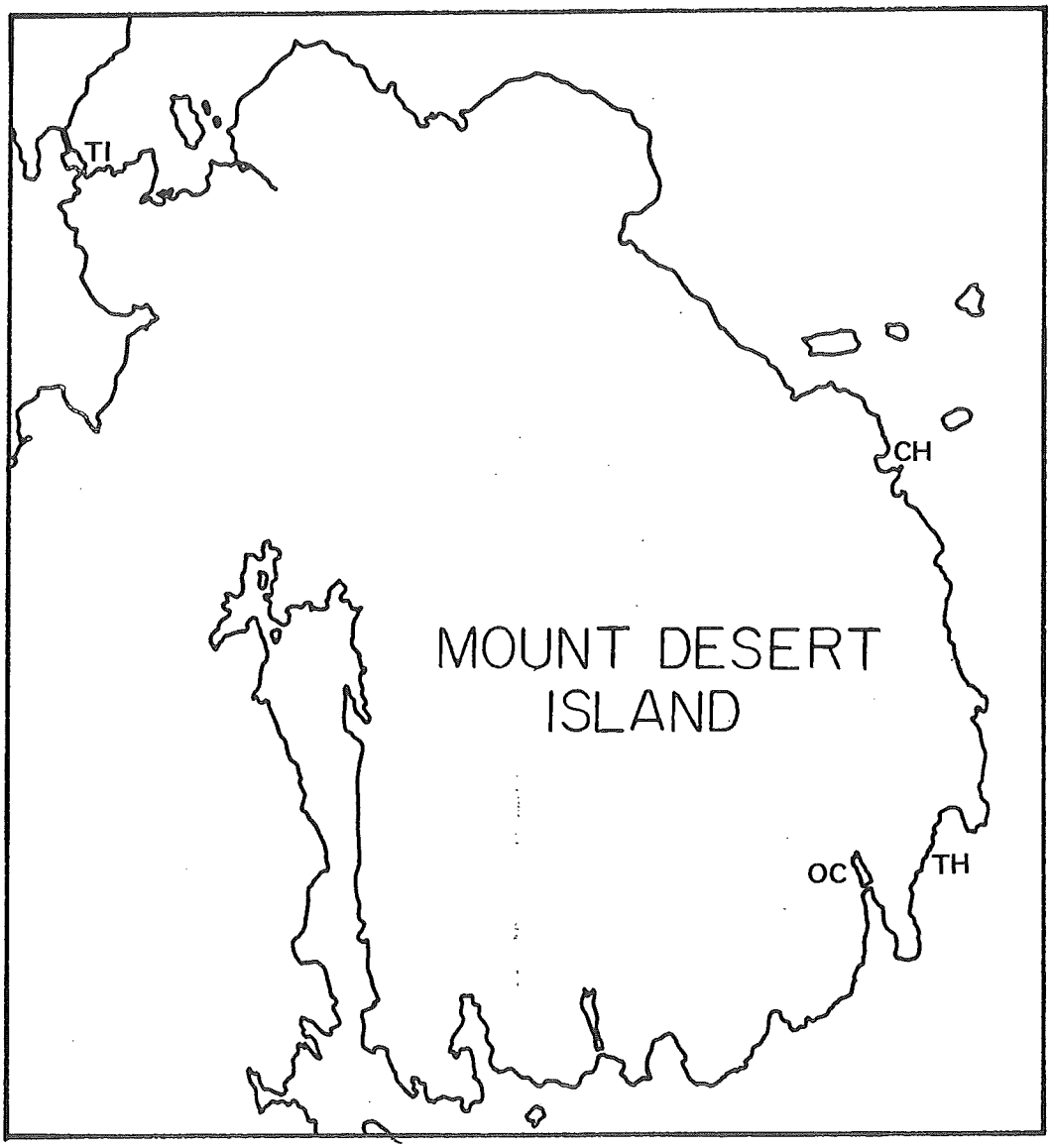

Figure 1. Map of Mount Desert Island showing sample locations. Mudflat sites are Thompson Island (TI) and Otter Cove (OC). Rocky intertidal sites are Compass Harbor (CH) and Thunder Hole (TH).

The study area was a small cove east of the Thompson Island picnic area (Fig. 2). The transect was located down the approximate center of the mudflat, running NNW. The upper end of the transect was marked with a white 3/4" PVC pipe driven into the ground between a pine tree and a white birch tree on the landward side of a path that runs along the head of the cove. From that stake, the transect ran down the long axis of the mudflat with the first station (High Intertidal) located 103 m from the stake, and the second station (Low Intertidal) located 47 m further toward the water. The western shoreline of the inner cove is salt marsh with a few rock outcroppings. Both the High and the Low stations were located about 18 m from rock outcroppings, measured perpendicular to the transect.

Compass Harbor This site was the first of our rocky intertidal stations. It is a relatively shallow cove located between Dorr Point and Ogden Point, just south of the town of Bar Harbor (Fig. 1). The sample locations were two large outcroppings of rock located on a sand-gravel beach (Figs. 3-5). The quadrats were located with two stainless steel bolts, drilled into the rock and then cemented. The general direction of exposure of the cove is to the northeast where Bald Porcupine Island offers some protection from the open waters of Frenchman Bay.

Thunder Hole This rocky intertidal site is located on the southeast coast of Mount Desert Island about one-half mile north of Thunder Hole (Fig. 1). To locate the exact sample site, park at the Thunder Hole lot and exit the lot at the northern end. Cross the road to the water side, walk south 10 to 20 m to a path leading down to the rocks and the water. Toward the water and somewhat to the south, a rock ledge joining a vertical rock face will be apparent (Fig. 6). The quadrat was located on the seaward side of that ledge about 2 m south of the northern corner; the stainless steel bolts were fastened to the vertical rock face about 1.5 m above the ledge. The site was exposed to the southeast to the open Gulf of Maine.

Rocky Intertidal Procedure

At each of the rocky intertidal sites (Compass Harbor and Thunder Hole), stations were set up by drilling a hole into the rock surface, cementing in a stainless steel pin, and adding a mark with white epoxy-based paint; there were two separate sites at Compass Harbor and one at Thunder Hole. We used a 1 x 0.5 m frame made from PVC pipe divided into two 0.25-m^2 sections as a photographic reference point and photographed each section of the frames separately. The frames were located initially so that the upper limit of the barnacle zone fell within the upper section and the pins set into the rock were used as reference points; subsequent samples used the pins to duplicate the placement of the frames. A string tied between the pins was used to align the top of the center bar of the frame; the left side of the frame was pushed tightly against the pin. The pins showed no evidence of damage at the end of the 3-year sampling period although the white paint was no longer visible. The photographs were

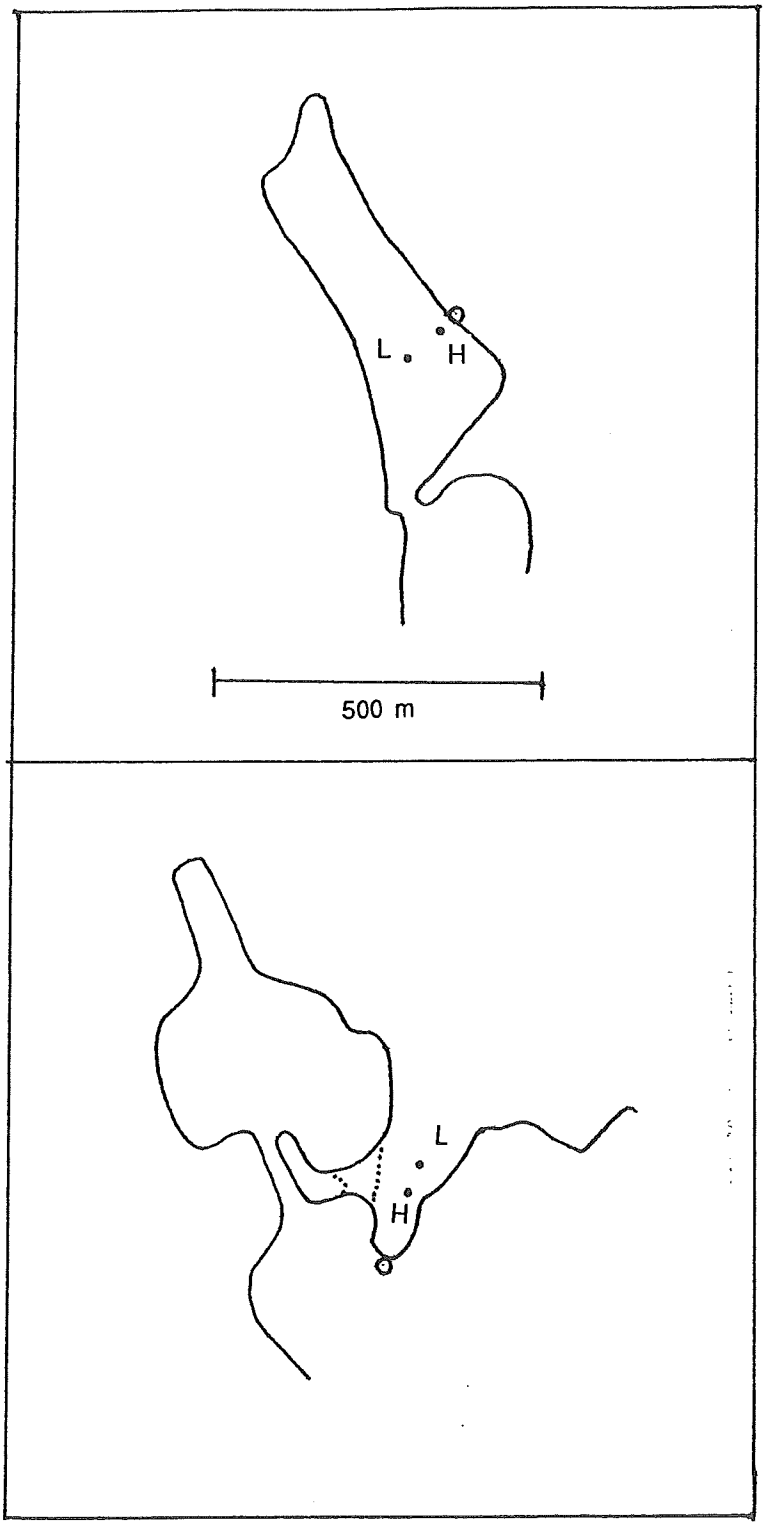

Figure 2. Map of Otter Cove (upper) and Thompson Island mudflat sample locations. The locations of the High (H) and Low (L) intertidal stations are indicated for each site. The pin (Otter Cove) or stake (Thompson Island) that marks the upper end of the transect is indicated with an open circle.

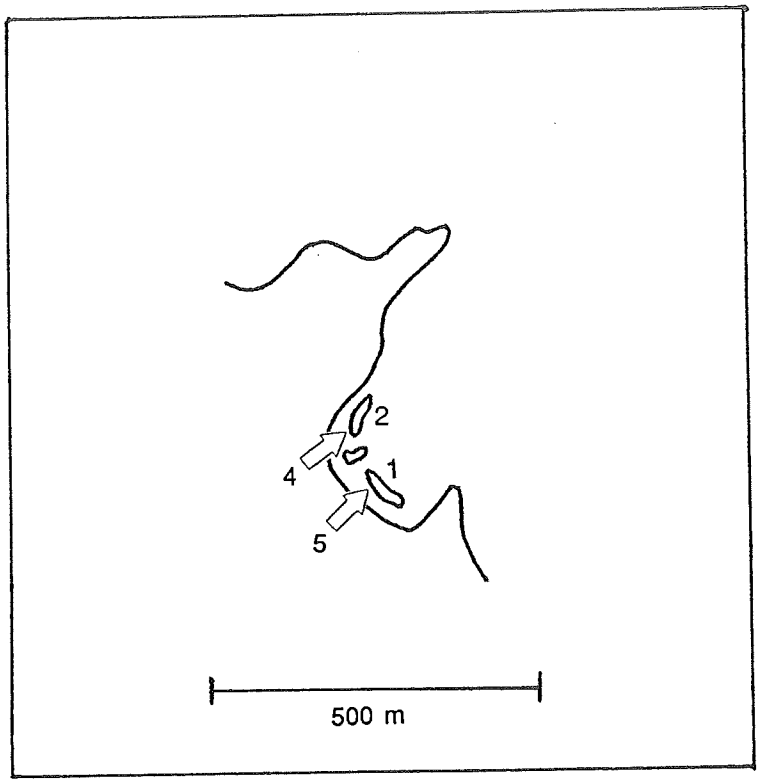

Figure 3. Map of Compass Harbor sample site. The location of the two sample locations are marked with numbers. The arrows and numbers indicate the location and direction of the photographs in Figs. 4 and 5.

Figure 4. Photograph of Compass Harbor 2 sample site. The arrow points to the PVC frame.

Figure 5. Photograph of Compass Harbor 1 sample site. The arrow points to the PVC frame.

Figure 6. Photograph of Thunder Hole sample site. The arrow points to the location of the sampling quadrat, located on the seaward face of the rock wall.

digitized using a digitizing pad and Sigma-Scan software (Jandel Scientific) and the percent cover of the barnacles was measured ; we also counted the "pioneer" individuals (isolated barnacles found above the heavily-colonized zone). This procedure was repeated for each of the quadrats.

Mudflat Procedure

We established two stations at each of the mudflat sites (Compass Harbor and Thompson Island), one at the extreme upper elevation of the mudflat and one at the lowest possible exposure. Sampling procedure was to take four 150-cm^2 cores to a depth of 20 cm, sieve the sediment through 0.5-mm sieves in the field, and preserve the animals and remaining sediment with formalin and rose bengal (to stain the animals). In the laboratory, the animals were removed, counted, and identified to the lowest possible taxa (generally species); a list of the taxonomic literature used in identifying the animals is presented as Appendix I. Each sample from Otter Cove took about 10 hours to process (including picking out the animals from the sediment residue, sorting, identifying and enumerating) while samples from Thompson Island required about 20 hours; Thompson Island samples required more processing time due to the greater amount of organic and shell debris in the samples, the greater abundance of organisms, and the increased species diversity. Including the time required to collect the samples, each sampling date involved about 350 person-hours of effort for the mudflat samples alone. All organisms collected in October 1987, as well as an example of each new taxa collected in later samples, were preserved in 70% alcohol and archived at the Resource Management Office at Acadia National Park.

Abundance data are reported in the data tables on a per-sample basis. In order to convert these abundances to a per m^2 basis, the numbers must be multiplied by 67.

For each sample both the Shannon Index of Diversity (H') and the Pielou Index of Evenness (E) were calculated (Heip et al., 1988). Where p_i is the proportion of the total number of individuals in a sample belonging to the ith taxon and T is the total number of taxa in the sample, then

$$H' = - \Sigma p_i \cdot \log_2 p_i$$

and

$$E = H' / \log_2 T .$$

The relationship among samples was investigated quantitatively with cluster analysis (Heip et al., 1988). Abundance data for each sample were transformed to the logarithm of the abundance + 1 and then a matrix of similarity coefficients was calculated; we used the Czekanowski coefficient *S*:

$$S = 2 \cdot W / (A + B)$$

where A = total abundance in sample 1, B = the total abundance in sample 2, and W = the sum for all taxa of the lesser of the abundance of each taxa in either sample 1 or sample 2. The clustering of the stations was agglomerative, using group-average sorting.

In addition to the large cores, smaller 1.6-cm^2 cores were taken from each station to a depth of 1 cm; four of these cores were combined in an acid-washed glass vial with a teflon-lined cap to make one sample of 6.4 cm^3 and five vials were filled at each location. These sediment samples were frozen and have also been archived at the Resource Management Office in order to provide a baseline with which to compare future samples; for example, if a problem were to arise with a suspected pollutant in the future, it would be possible to use these samples to determine whether concentrations actually had increased over time. No specific contaminant analyses were performed as part of this study since the analyses are expensive and might not have included all potential pollutants of interest; in addition, techniques may be developed that would make the current analyses less useful. The approach taken in this study was to archive the samples until such time as specific analyses are desired for targeted pollutants.

Sampling Frequency

Six sets of samples were taken during this project (Table 1). The rocky intertidal stations were sampled during each of these trips and sediment samples were taken from each of the mudflat sites. The more intensive sampling for macroinvertebrates was done during all trips except May 1988. The October date was chosen so that the animals would be sampled after the warm-weather growth period but before winter mortality could occur. The June and July samples in 1989 were chosen to give an indication of the magnitude of seasonal variability.

RESULTS AND DISCUSSION

Rocky Intertidal

The upper intertidal in the rocky intertidal was covered primarily by one species, the barnacle *Semibalanus* (formerly *Balanus*) *balanoides*, as is common in the New England rocky intertidal (Menge, 1976). The completed set of rocky intertidal photographic samples (Table 2) showed that the percent coverage in the upper quadrats

was fairly stable over the 3-year period with the exception of quadrats I and II at the Compass Harbor 2 station. There did not appear to be any marked changes over the winter for these stations. After May 1988 there was a steady decline in coverage at Compass Harbor 2 with ultimate reductions in coverage ranging from 38 to 96%. The cause of the decrease would appear to be local since coverage at the nearby Compass Harbor 1 station was relatively stable; that would eliminate factors such as water quality or temperature. The most likely explanation is predation pressure. Compass Harbor 2 has a subtidal pool located directly below the sample area that could serve as a refuge for predators at low tide; Compass Harbor 1 is located much further from the low water mark and may therefore be less subject to predation. Predation by the snail *Thais lapillus* was shown to control *Semibalanus balanoides* population levels at a nearby site, Grindstone Neck (Menge, 1976). Sporadic desiccation can also cause significant mortality to barnacles (Menge, 1976), but since Compass Harbor 1 was the most sheltered of the three sites and least subject to wave spray, mortality due to desiccation should have been more severe there than at Compass Harbor 2, in contrast to what was observed.

There were large numbers of single, "pioneering" individuals at elevations somewhat higher than the majority of the population (Table 2). These numbers varied to a greater extent than did the percent coverage of the adults. Again the two Compass Harbor stations showed different patterns with a peak in abundance in October 1989 at Station 1 occurring at the same time as a marked drop in abundance at Station 2.

For our coverage measurements, we included only those areas covered by barnacles large enough to be distinguished as individuals. However, there was a heavy set of barnacle spat apparent in October 1989 at Compass Harbor 2 that was not included in the coverage calculation, and it is possible that if sampling had continued into 1990, there would have been a marked increase.

For purposes of the baseline study, these data will be most useful in a comparative sense with average distributions presumably rising as sea level rises. The complete set of distributions are given in Appendix II and the original set of slides has been archived at the Resource Management Office of the Park.

Mudflats

A total of 54 taxa of macroinvertebrates were collected from the two areas, 25 from Otter Cove and 48 from Thompson Island (Tables 3-13). The number of species was certainly higher since the oligochaetes and the turbellaria included several species; additionally, what we called *Capitella capitata* may well have included more than one sibling species, morphologically difficult to distinguish but biologically unique (Grassle and Grassle, 1976). In any one sample, however, the number of species was much lower, ranging from 5 to 14 at Otter Cove and from 16 to 24 at Thompson Island (Tables 3-7).

The Otter Cove macrofaunal community was dominated numerically by the oligochaetes and the polychaete *Streblospio benedicti*; for the three October samples, those two taxa accounted for 97% of the Low intertidal individuals and 98% of the High intertidal individuals. At Thompson Island mudflat, the numerical dominants were the oligochaetes, the polychaetes *Streblospio benedicti* and *Polydora ligni*, the snail *Hydrobia minuta (= truncata)*, and the clam *Astarte subaequilatera*; for the three October samples, those five taxa accounted for 77% of the Low intertidal individuals and 85% of the high intertidal individuals. Although macrofaunal biomass was not determined in this study, biomass would have been dominated in most samples by adults of *Nereis virens* and occasionally by adult *Glycera* sp.

The dominant taxa of these two mudflat sites include several feeding types. Of the larger polychaetes, *Glycera* is a carnivore that feeds mainly on other polychaete and oligochaete worms and *Nereis* is an omnivore that feeds on sediment organic matter and other macrofauna. Of the molluscs, *Astarte* is a suspension feeder and *Hydrobia* is a deposit feeder that feeds on the organic matter and microbes in the sediment. Both the smaller polychaetes, *Streblospio* and *Polydora*, are facultative deposit/suspension feeders (they can switch between the two modes and utilize not only the sediment, but also the flocculent layer resuspended just above the sediment surface by near-bottom currents).

Thompson Island macrofaunal populations were almost 2½ times as abundant as those at Otter Cove in October, probably reflecting both the organic input from the surrounding salt marsh and the finer sediment at Thompson Island. Otter Cove appears to be fairly isolated from significant sources of sediment; tidal exchange occurs with the exposed southern shore of Mount Desert Island where there presumably is little fine sediment available. Tidal exchange to the Thompson Island mudflat occurs with Mount Desert Narrows on the northern shore of the island; the suspended sediment load there should be higher than at Otter Cove due to the proximity to riverine sources and to the relatively sheltered nature of the area.

In addition, the macrofaunal community at Thompson Island was more diverse than that at Otter Cove. Not only were there almost twice as many taxa collected during the entire study at Thompson Island than at Otter Cove, but the average species richness (in this case, number of taxa per sample), sample diversity and evenness were higher as well. Higher diversity means that the degree of uncertainty about the identity of any particular individual in a sample is greater as is the chance of encounter with a different taxa; higher evenness means that the sample is less likely to be dominated by one or several taxa. Otter Cove was clearly dominated by two taxa, the oligochaetes and the polychaete *Streblospio benedicti* and that was reflected in comparatively low diversity and evenness; at Thompson Island, there were more dominant taxa and the result was higher diversity and evenness. In general, higher diversity communities tend to be less disturbed and more stable than do lower diversity communities. Thompson Island appears to be a richer environment in terms of available food and this may explain why it can support a greater variety of species than can Otter Cove.

Cluster analysis summarizes the similarity or differences among samples by grouping them according to the degree of similarity. The similarity index used in this study, the Czekanowski coefficient, is calculated on the basis of similarity of abundances for each taxa between samples; the closer the abundances, the higher the degree of similarity. The most obvious finding from the cluster analysis for the Thompson Island and Otter Cove samples was that there was a marked difference between the two sites, reinforcing the previous discussion (Table 12, Fig. 7). Within each mudflat, there was no indication that samples could be grouped on the basis of whether they were Low or High intertidal. The cluster analysis also indicated that seasonal variability was significant. Thus, the conclusions from the cluster analysis are that sampling should at the same time each year reduced the effect of seasonal variability, but that sampling at both low and high elevations did not markedly improve the overall characterization of each site.

The study was designed to evaluate the effects of both seasonal and interannual variability on the reliability of monitoring data for these sites. The cluster analysis showed that the June and July samples made up a group distinct from the October samples for both of the sample sites (Table 12, Fig. 7). The most obvious seasonal effect was an influx of juvenile *Nereis* and *Eteone longa* in the July samples from Thompson Island, but there were other changes in species abundances as well. The October samples were not markedly more similar to each other than to the June or July samples. In general, the abundances of organisms were less stable from year to year than were the number of species per sample and the diversity indices; thus changes in the latter attributes may prove to be the most useful in future monitoring. For example, there was a decline in oligochaete abundance at both sites between 1988 and 1989, but the fact that the decline occurred at both sites indicates that the cause was probably not local and anthropogenic, but more likely regional and natural (related to weather, for example); similar degrees of natural variability have been observed in other studies (e.g. Cammen et al., 1984). Thus, it important to have a baseline of several years of data, as generated by this study, in order to assess the significance of an apparent change in community structure or abundance.

There have been two other studies of mudflats near to Acadia National Park. Commito (1982) examined a mudflat in Jonesboro, Maine, east of the sites from this study. *Corophium volutator* dominated the mudflat fauna numerically and accounted for 63% of the individuals; in contrast *C. volutator* was not present at the Otter Cove site and was present but rare at Thompson Island. Larsen and Doggett (in press) sampled a series of mudflats along the Maine coast including one located at Addison, Maine, also east of Acadia National Park. They found the macrofauna to be less abundant at Addison than at three of the other four mudflats they sampled and found that the diversity and the average number of species per sample were the lowest of all their mudflats. For comparison, the average abundance they found at the Addison mudflat was 2,069 individuals m^{-2}; at Otter Cove, abundances ranged from 12,315 to 48,709 m^{-2} and at Thompson Island, the range was 45,460 to 78,591 m^{-2}. At the Addison mudflat there were an average of 9.1 taxa in each 0.25-m^2 sample while in much smaller 0.015-m^2

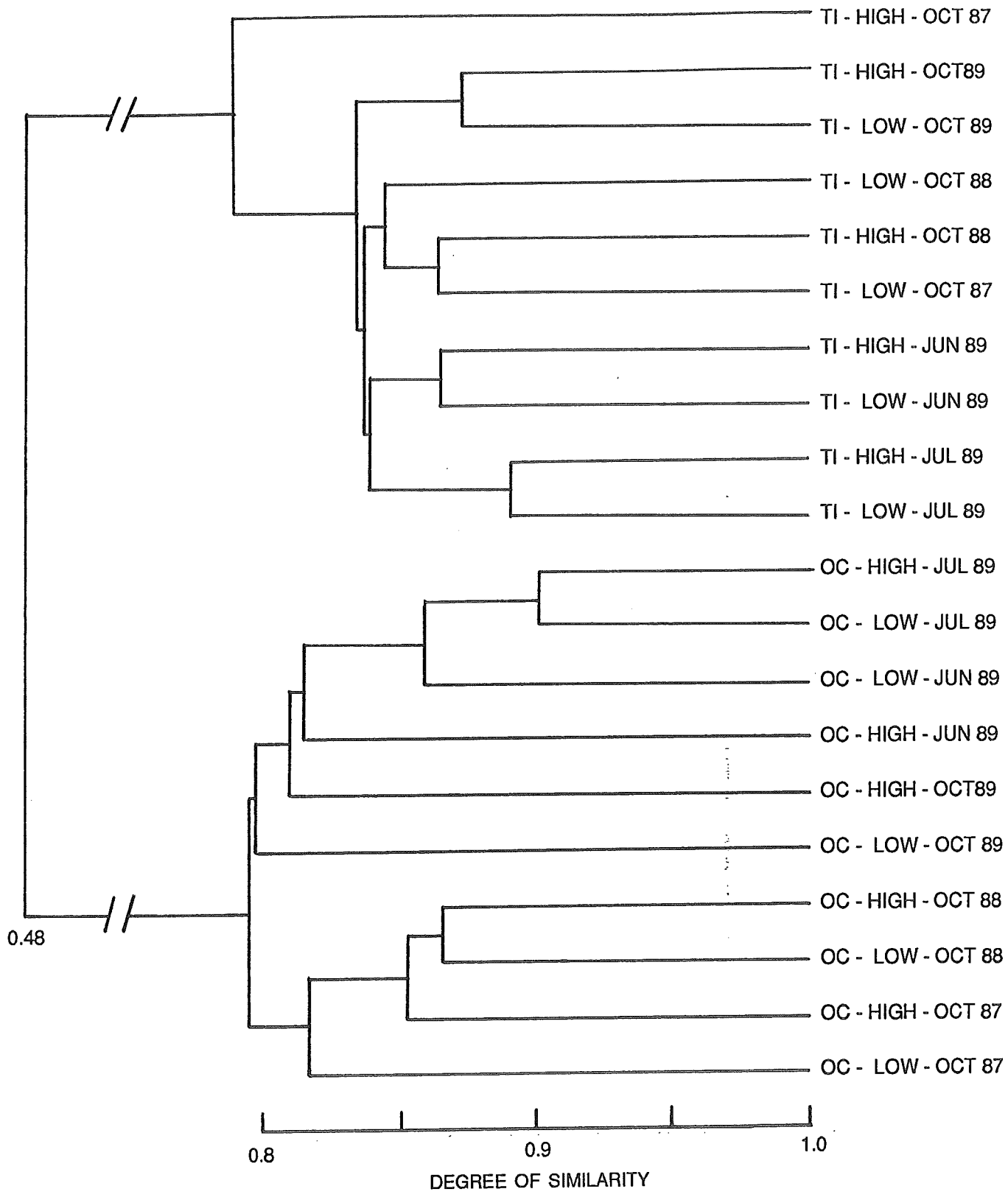

Figure 7. Cluster diagram showing the degree of similarity among all the mudflat samples.

samples from this study, we found an average of 8.4 taxa m^{-2} at Otter Cove and 19.4 taxa per sample at Thompson Island. Since that study used a 1.0-mm sieve while this study used a 0.5-mm sieve, the difference in abundances are probably due in part to methodology; differences in species richness are more difficult to evaluate since the smaller sieve size in this study would tend to increase the number of taxa recovered, but the smaller sample size would tend to counter that effect. Abundances at the other four mudflats sampled by Larsen and Doggett ranged from 1,050 to 22,322 m^{-2} and taxa per sample ranged from 18.4 to 22. Thus, Thompson Island was comparable in species richness to other Maine mudflats, but Otter Cove was relatively depauperate.

There were no obvious indicator species that were consistently present in either the low or the high intertidal zones but not in the other. At Otter Cove, a total of 6 taxa were found only in the low intertidal samples and 3 were found only in the high intertidal samples (Table 13); none of those 9 taxa was found on more than two sampling dates, however. At Thompson Island, 8 taxa were found only in the low intertidal and 9 taxa were found only in the upper intertidal (Table 13); again, none of those taxa was found on more than two sampling dates.

RECOMMENDATIONS

This project was designed to establish a baseline of data on intertidal macrofauna in Acadia National Park for use in evaluating future impacts from either pollution or sea level rise. The following recommendations are intended to guide Park personnel in utilizing that data and in carrying out future monitoring studies. They acknowledge the fact that Park resources are limited both in terms of personnel and funding and are likely to remain so in the future.

Routine monitoring should be repeated on a decadal scale. The anticipated gradual rise in sea level (on the order of 1 cm per decade) is unlikely to result in measurable effects over shorter time intervals. Certainly any sudden increase in pollutant loading would be cause to repeat the monitoring program, but given no overt indication of change, decadal monitoring should be sufficient. Collection and archival (or analysis) of sediment should be carried out at 5-year intervals since collection is inexpensive and not labor intensive, but may nevertheless offer valuable insight into the time-course of pollutant accumulation in the environment.

Sampling should take place in October. Sampling at the same time each year eliminates seasonal variability as a factor. There was relatively little variation between the summer and the fall samples, certainly not enough to justify the additional expense. Fall sampling avoids the reproductive season and comes at a time when recruits from earlier in the year will have experienced several months of growth.

The sampling protocol from this study should be followed as closely as possible in order to make the results comparable. However, recognizing the effort that goes into sorting each core and the fact that most of the species occur near the surface, it may be possible to take shallower cores and thus save processing time; but this change would need to be tested rigorously and still would not reduce the substantial time necessary for taxonomy and enumeration. The results from this survey have verified that although the relatively large samples were tedious to process, they contained many comparatively rare species that probably would have been missed with a less intense sampling effort. For example, 15 of the species from the low intertidal at Thompson Island were present at an abundance of less than 1 individual per core. It is particularly important to verify the presence of these less abundant species since it is not possible to predict the species that might dominate in the future; it is necessary to show that they were not simply overlooked or missed in the sampling.

For the same reason, the number of cores should remain the same. This study did not show substantial differences between the high and low intertidal mudflat stations and it could be argued that either one of these stations should be eliminated or that they should be combined; however, that would eliminate the possibility of identifying any substantial effects due to future sea level changes.

Sample sites were chosen to provide wide geographic coverage within the Park and there is no reason to change them; additionally that would entail loss of the baseline data. Sample locations need to be duplicated as exactly as possible.

Additional data such as dissolved oxygen might be included in future monitoring, but it is unlikely to become a problem at these stations. Other water chemistry parameters such as dissolved nutrients might be measured, but again there is no reason to anticipate a problem; if in the future a particular toxicant is identified, then monitoring for that particular chemical would be appropriate.

Provision needs to be made for routine maintenance of the archived samples and the macrofaunal reference collection. The archived sediment samples need to be kept frozen at the lowest practical temperature. The macrofaunal reference collection should be checked every three months to be sure the vials have sufficient 70% alcohol to keep the specimens moist.

There is no need to protect the intertidal mudflats from normal visitor activity. The species found in this study are unlikely to be affected by normal traffic on the mudflat, including periodic clamming or worming activities. For the most part, the species are small infauna that are not attractive for collection purposes and are also relatively fecund. Moreover, the difficulty of movement on the mudflats makes it unlikely that they will ever be exposed to intense visitor traffic.

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Table 1. Dates of field sampling in Acadia National Park.

Dates	Barnacle Survey	Mudflat Survey
27-30 October 1987	X	X
10 May 1988	X	
18-19 October 1988	X	X
5-6 June 1989	X	X
20-21 July 1989	X	X
12-13 October 1989	X	X

Table 2. Areas of heavy colonization and numbers of single, "pioneer" barnacles from the rocky intertidal sample quadrats. Areas are given as the percent of the total area in the upper frame that is covered.

		Percent Coverage					
Station	Quadrat	Oct 1987	May 1988	Oct 1988	Jun 1989	Jul 1989	Oct 1989
Thunder Hole	I	27.5	26.7	30.2	31.0	27.5	26.9
	II	21.8	19.2	22.4	23.2	21.9	18.6
	III	18.8	20.5	19.1	19.4	17.0	18.7
	IV	11.9	21.9	11.8	16.3	11.6	17.0
Compass Harbor 1	I	2.6	2.5	2.3	2.4	0.8	2.0
	II	3.4	3.2	3.1	4.7	2.5	3.6
	III	4.1	4.6	5.0	6.4	3.5	5.4
	IV	0.7	0.7	0.7	1.1	0.2	0.6
Compass Harbor 2	I	16.1	16.1	6.3	1.6	1.3	0.6
	II	27.7	24.8	12.3	7.1	5.4	4.9
	III	38.0	36.2	31.3	22.6	21.1	21.9
	IV	42.1	53.0	45.2	33.2	28.8	33.1

		Single Individuals					
Station	Quadrat	Oct 1987	May 1988	Oct 1988	Jun 1989	Jul 1989	Oct 1989
Thunder Hole	I	340	114	45	36	10	54
	II	204	98	58	25	18	26
	III	87	32	31	17	7	12
	IV	115	98	131	55	11	11
Compass Harbor 1	I	18	32	13	11	9	289
	II	54	51	47	40	28	153
	III	189	142	80	44	36	105
	IV	20	58	24	7	46	236
Compass Harbor 2	I	156	100	176	47	5	1
	II	133	92	206	83	23	34
	III	117	105	142	78	4	11
	IV	303	99	106	138	12	34

Table 3. Numbers of individuals in low (L1-4) and high (H1-4) intertidal mudflat cores -- October 1987.

	Otter Cove (Number of Individuals)								Thompson Island (Number of Individuals)							
Species	L1	L2	L3	L4	H1	H2	H3	H4	L1	L2	L3	L4	H1	H2	H3	H4
Turbellaria:	0	0	0	0	0	0	0	0	0	0	4	10	13	2	10	15
Oligochaeta:	303	701	566	399	189	376	310	61	223	485	369	329	760	369	427	407
Polychaeta:																
Aglaophamus circinata	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Aglaophamus neotenus	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0
Capitella capitata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaetozone setosa	0	0	0	0	0	0	0	0	19	14	19	28	4	4	6	13
Eteone heteropoda	0	0	0	0	0	0	0	0	0	0	1	3	0	4	1	0
Eteone longa	0	0	0	1	1	3	1	1	14	18	8	11	4	1	1	1
Flabelligera affinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycera sp.	0	0	0	0	0	1	0	0	2	4	4	4	16	22	18	27
Goniada norvegica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harmothoe oerstedi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteromastus filiformis	0	2	2	0	0	2	1	1	17	29	8	19	19	18	22	16
Microphthalmus sczelkowii	0	0	0	0	0	0	0	0	1	0	0	1	4	0	2	9
Nephtys caeca	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
Nereis diversicolor	2	10	9	9	0	0	0	0	0	0	0	0	0	0	0	0
Nereis virens	11	7	6	8	6	5	9	1	4	3	4	1	7	3	3	1
Ophelina acuminata	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Phyllodoce maculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Phyllodoce mucosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Polydora ligni	0	6	8	2	7	15	12	6	30	134	20	26	247	222	354	238
Polynoidae sp. A	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Pygospio elegans	0	0	0	0	0	0	1	1	5	1	13	7	21	12	2	37
Scolelepis squamatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scolocolepides viridis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scoloplos armiger	0	0	0	0	0	0	0	0	16	29	12	12	4	6	5	6
Streblospio benedicti	129	265	205	234	93	126	78	108	181	203	141	199	149	59	96	109
Syllidae sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Gastropoda:																
Hydrobia minuta	0	0	0	0	0	0	0	0	21	132	70	142	161	8	46	49
Littorina obtusata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Margarites costalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia:																
Astarte subaequilatera	0	0	0	0	0	0	0	0	80	186	110	158	195	56	51	94
Macoma balthica	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0
Modiolus modiolus	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Mya arenaria	1	1	1	0	0	1	0	1	0	0	0	0	2	0	0	1
Ostracoda:	0	0	0	0	0	0	0	0	0	0	0	0	7	0	1	3
Copepoda:																
Harpacticoid sp. A	2	5	8	0	3	7	1	0	1	13	2	51	69	12	23	24
Harpacticoid sp. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 3 (cont.). Numbers of individuals in low (L1-4) and high (H1-4) intertidal mudflat cores -- October 1987.

Species	Otter Cove (Number of Individuals)								Thompson Island (Number of Individuals)							
	L1	L2	L3	L4	H1	H2	H3	H4	L1	L2	L3	L4	H1	H2	H3	H4
Cumacea:																
Oxyurostylis smithi	0	0	0	0	0	0	0	0	1	4	0	0	0	0	1	0
Isopoda:																
Chiridotea coeca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jaera marina	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Amphipoda:																
Ampelisca ?vadorum	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Corophium volutator	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Corophium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gammarus mucronatus	0	0	0	0	0	0	0	0	0	4	0	2	1	0	0	1
Harpinia propinqua	0	0	0	0	0	0	0	0	6	4	1	8	38	3	5	24
Marinogammarus finmarchius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marinogammarus obtusatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orchestia grillus	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	3
Pontogeneia inermis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decapoda:																
Crangon septemspinosa	0	0	1	0	0	0	0	6	0	4	0	2	3	0	0	1
Holothuria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipuncula:																
Golfingia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemichordata:																
Saccoglossus kowalewskyi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Total Numbers	449	998	806	655	300	539	413	188	622	1271	786	1013	1727	806	1078	1081
Number of Species	7	9	9	8	7	11	8	11	17	19	16	19	22	20	24	24
Shannon Index of Diversity (H')	0.34	0.33	0.35	0.36	0.39	0.39	0.34	0.48	0.79	0.81	0.73	0.85	0.80	0.71	0.73	0.86
Pielou Index of Evenness (e)	0.41	0.35	0.37	0.40	0.46	0.37	0.37	0.46	0.64	0.64	0.60	0.67	0.60	0.55	0.53	0.63

Table 4. Numbers of individuals in low (L1-4) and high (H1-4) intertidal mudflat cores -- October 1988.

	Otter Cove (Number of Individuals)								Thompson Island (Number of Individuals)							
Species	L1	L2	L3	L4	H1	H2	H3	H4	L1	L2	L3	L4	H1	H2	H3	H4
Turbellaria:	0	0	0	0	0	0	0	0	4	6	4	3	9	8	12	3
Oligochaeta:	510	167	414	193	303	442	432	218	302	432	177	182	473	481	400	512
Polychaeta:																
Aglaophamus circinata	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Aglaophamus neotenus	0	1	0	3	1	1	0	1	0	0	0	0	0	0	0	0
Capitella capitata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaetozone setosa	0	0	0	0	0	0	0	0	1	13	8	1	75	35	37	30
Eteone heteropoda	0	0	0	0	0	0	0	0	0	1	2	5	2	1	0	0
Eteone longa	3	0	0	3	0	0	0	1	1	0	0	0	1	11	0	10
Flabelligera affinis	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Glycera sp.	2	0	1	0	0	1	1	0	8	10	5	11	2	5	3	4
Goniada norvegica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harmothoe oerstedi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteromastus filiformis	1	0	0	2	0	0	0	0	9	28	13	13	14	12	27	14
Microphthalmus sczelkowii	0	0	0	0	0	0	0	0	2	0	1	1	1	1	0	0
Nephtys caeca	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Nereis diversicolor	2	2	0	3	0	0	2	4	0	0	0	0	0	0	0	0
Nereis virens	5	2	12	11	2	8	6	4	1	4	0	1	0	4	2	0
Ophelina acuminata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllodoce maculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllodoce mucosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polydora ligni	11	22	30	35	19	12	9	11	106	105	48	77	31	76	70	143
Polynoidae sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pygospio elegans	0	1	0	1	1	0	1	1	24	75	9	28	31	45	15	29
Scolelepis squamatus	0	0	0	0	0	0	0	0	1	1	0	4	0	0	2	2
Scolecolepides viridis	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scoloplos armiger	0	0	0	0	0	0	0	0	14	11	2	7	16	31	13	41
Streblospio benedicti	81	64	52	54	79	99	138	82	132	184	71	176	234	179	171	152
Syllidae sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda:																
Hydrobia minuta	0	0	0	0	0	0	0	0	70	0	11	34	88	57	188	118
Littorina obtusata	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0
Margarites costalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia:																
Astarte subaequilatera	0	0	0	0	0	0	0	0	50	46	44	62	150	138	141	87
Macoma balthica	0	1	0	0	0	0	0	0	0	0	1	12	12	2	24	6
Modiolus modiolus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mya arenaria	0	0	3	1	3	1	0	1	0	0	0	0	0	0	1	0
Ostracoda:	0	0	0	0	0	0	0	0	0	1	0	3	2	3	1	0
Copepoda:																
Harpacticoid sp. A	6	6	8	10	0	0	6	11	12	4	8	14	23	35	15	25
Harpacticoid sp. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

Table 4 (cont.). Numbers of individuals in low (L1-4) and high (H1-4) intertidal mudflat cores -- October 1988.

	Otter Cove (Number of Individuals)								Thompson Island (Number of Individuals)							
Species	L1	L2	L3	L4	H1	H2	H3	H4	L1	L2	L3	L4	H1	H2	H3	H4
Cumacea:																
Oxyurostylis smithi	0	0	0	0	0	0	0	0	1	0	1	2	0	0	0	2
Isopoda:																
Chiridotea coeca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jaera marina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphipoda:																
Ampelisca ?vadorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophium volutator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gammarus mucronatus	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0
Harpinia propinqua	0	0	0	0	0	0	0	0	0	1	0	6	0	0	0	0
Marinogammarus finmarchius	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Marinogammarus obtusatus	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Orchestia grillus	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0
Pontogeneia inermis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Decapoda:																
Crangon septemspinosa	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Holothuria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipuncula:																
Golfingia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemichordata:																
Saccoglossus kowalewskyi	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
Total Numbers	622	266	520	316	408	566	597	338	742	923	405	644	1166	1124	1126	1178
Number of Species	10	9	7	11	7	9	9	14	19	18	17	22	19	18	19	16
Shannon Index of Diversity (H')	0.29	0.46	0.33	0.55	0.34	0.30	0.34	0.47	0.79	0.73	0.79	0.90	0.80	0.83	0.85	0.81
Pielou Index of Evenness (e)	0.29	0.48	0.40	0.53	0.40	0.32	0.36	0.41	0.62	0.58	0.64	0.67	0.63	0.66	0.66	0.67

Table 5. Numbers of individuals in low (L1-4) and high (H1-4) intertidal mudflat cores -- June 1989.

	Otter Cove (Number of Individuals)								Thompson Island (Number of Individuals)							
Species	L1	L2	L3	L4	H1	H2	H3	H4	L1	L2	L3	L4	H1	H2	H3	H4
Turbellaria:	0	0	0	0	0	0	0	0	0	0	0	3	4	6	2	0
Oligochaeta:	352	295	244	295	281	213	127	141	482	396	384	338	637	1086	369	706
Polychaeta:																
Aglaophamus circinata	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Aglaophamus neotenus	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Capitella capitata	0	0	0	1	0	0	0	0	1	0	3	0	8	2	0	0
Chaetozone setosa	0	0	0	0	0	0	0	0	81	8	25	18	22	31	12	24
Eteone heteropoda	0	0	0	0	0	0	0	0	1	1	0	1	0	2	1	0
Eteone longa	1	0	0	2	0	0	1	0	1	0	0	0	3	2	4	2
Flabelligera affinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycera sp.	0	0	0	0	0	0	0	0	6	5	4	0	2	0	2	3
Goniada norvegica	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Harmothoe oerstedi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteromastus filiformis	0	1	0	0	0	0	1	0	5	8	21	0	10	12	14	21
Microphthalmus sczelkowii	0	0	0	0	0	0	0	0	1	7	1	4	0	5	1	2
Nephtys caeca	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0
Nereis diversicolor	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Nereis virens	5	2	2	2	2	2	2	3	23	7	0	3	1	39	7	4
Ophelina acuminata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllodoce maculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllodoce mucosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polydora ligni	2	1	6	10	3	1	5	3	23	13	20	13	3	4	4	4
Polynoidae sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pygospio elegans	1	5	1	1	2	2	1	2	113	58	65	25	33	37	32	40
Scolelepis squamatus	0	0	0	0	0	0	0	0	2	0	0	1	0	0	1	1
Scolocolepides viridis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scoloplos armiger	0	0	0	0	0	0	0	0	6	5	6	12	6	27	10	19
Streblospio benedicti	29	39	45	48	17	18	13	4	287	212	189	99	127	218	214	284
Syllidae sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda:																
Hydrobia minuta	0	0	0	0	0	0	0	0	46	44	64	50	33	23	23	54
Littorina obtusata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Margarites costalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia:																
Astarte subaequilatera	0	0	0	0	0	0	0	0	14	33	28	32	36	29	35	43
Macoma balthica	0	0	1	0	0	0	0	0	0	0	1	1	2	1	0	3
Modiolus modiolus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mya arenaria	0	0	0	0	2	0	0	1	0	0	0	1	0	0	0	0
Ostracoda:	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	1
Copepoda:																
Harpacticoid sp. A	1	4	1	2	0	0	0	0	33	3	15	12	5	4	12	3
Harpacticoid sp. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5 (cont.). Numbers of individuals in low (L1-4) and high (H1-4) intertidal mudflat cores -- June 1989.

Species	Otter Cove (Number of Individuals)								Thompson Island (Number of Individuals)							
	L1	L2	L3	L4	H1	H2	H3	H4	L1	L2	L3	L4	H1	H2	H3	H4
Cumacea:																
Oxyurostylis smithi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isopoda:																
Chiridotea coeca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jaera marina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphipoda:																
Ampelisca ?vadorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophium volutator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophium sp.	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Gammarus mucronatus	0	0	0	0	0	0	0	0	2	0	1	2	0	0	1	0
Harpinia propinqua	0	0	0	0	0	0	0	0	2	2	1	0	0	0	0	0
Marinogammarus finmarchius	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Marinogammarus obtusatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orchestia grillus	0	4	1	2	0	0	1	1	0	0	0	0	0	0	0	0
Pontogeneia inermis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decapoda:																
Crangon septemspinosa	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Holothuria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipuncula:																
Golfingia sp.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Hemichordata:																
Saccoglossus kowalewskyi	0	0	0	0	0	0	0	0	2	2	1	0	2	0	2	1
Total Numbers	391	351	302	363	307	239	151	155	1129	806	830	616	934	1529	744	1214
Number of Species	7	8	9	9	6	8	8	7	20	19	19	18	20	18	19	18
Shannon Index of Diversity (H')	0.18	0.26	0.29	0.30	0.17	0.20	0.29	0.20	0.75	0.68	0.70	0.70	0.55	0.49	0.67	0.59
Pielou Index of Evenness (e)	0.21	0.29	0.30	0.31	0.21	0.23	0.32	0.23	0.58	0.53	0.55	0.55	0.42	0.39	0.52	0.47

Table 6 (cont.). Numbers of individuals in low (L1-4) and high (H1-4) intertidal mudflat cores -- July 1989.

Species	Otter Cove (Number of Individuals)								Thompson Island (Number of Individuals)							
	L1	L2	L3	L4	H1	H2	H3	H4	L1	L2	L3	L4	H1	H2	H3	H4
Cumacea:																
Oxyurostylis smithi	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0
Isopoda:																
Chiridotea coeca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jaera marina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphipoda:																
Ampelisca ?vadorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophium volutator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gammarus mucronatus	0	0	0	0	0	0	0	0	2	3	1	1	0	2	1	2
Harpinia propinqua	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Marinogammarus finmarchius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marinogammarus obtusatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orchestia grillus	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0
Pontogeneia inermis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decapoda:																
Crangon septemspinosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Holothuria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipuncula:																
Golfingia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemichordata:																
Saccoglossus kowalewskyi	0	0	0	0	0	0	0	0	1	1	2	3	4	0	1	6
Total Numbers	282	223	152	78	233	240	310	684	608	899	683	1357	1292	759	762	1052
Number of Species	8	8	9	6	8	5	6	9	19	18	21	22	20	21	20	20
Shannon Index of Diversity (H')	0.30	0.35	0.33	0.48	0.23	0.27	0.31	0.23	0.72	0.69	0.72	0.74	0.83	0.92	0.87	0.81
Pielou Index of Evenness (e)	0.33	0.39	0.34	0.62	0.26	0.39	0.39	0.25	0.57	0.55	0.55	0.55	0.64	0.70	0.67	0.62

Table 6. Numbers of individuals in low (L1-4) and high (H1-4) intertidal mudflat cores -- July 1989.

	Otter Cove (Number of Individuals)								Thompson Island (Number of Individuals)							
Species	L1	L2	L3	L4	H1	H2	H3	H4	L1	L2	L3	L4	H1	H2	H3	H4
Turbellaria:	0	0	0	0	0	0	0	0	2	2	0	1	1	2	0	3
Oligochaeta:	233	168	125	49	206	196	246	587	306	432	342	666	394	253	262	456
Polychaeta:																
Aglaophamus circinata	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Aglaophamus neotenus	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Capitella capitata	0	0	0	0	0	0	0	0	0	0	2	5	1	0	0	0
Chaetozone setosa	0	0	0	0	0	0	0	0	9	10	18	3	26	29	22	22
Eteone heteropoda	0	0	1	0	0	0	0	0	0	1	1	0	4	2	1	4
Eteone longa	0	3	2	2	2	0	1	2	52	65	46	42	71	59	54	64
Flabelligera affinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycera sp.	0	0	0	0	0	0	0	1	2	5	3	4	2	4	3	4
Gonlada norvegica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harmothoe oerstedi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteromastus filiformis	0	1	0	0	1	0	0	0	14	9	15	23	17	11	9	14
Microphthalmus sczelkowii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Nephtys caeca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nereis diversicolor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nereis virens	10	10	3	5	4	4	9	15	23	13	27	84	108	52	81	71
Ophelina acuminata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllodoce maculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllodoce mucosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polydora ligni	8	0	4	4	2	3	7	3	5	13	6	16	3	1	19	4
Polynoidae sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pygospio elegans	2	3	2	1	3	4	2	1	9	15	12	16	21	30	22	18
Scolelepis squamatus	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Scolocolepides viridis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scoloplos armiger	0	0	0	0	0	0	0	0	0	6	7	13	17	25	19	12
Streblospio benedicti	26	36	13	17	14	33	45	72	81	79	110	153	306	120	76	204
Syllidae sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda:																
Hydrobia minuta	0	0	0	0	0	0	0	0	10	11	6	46	42	40	20	36
Littorina obtusata	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Margarites costalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia:																
Astarte subaequilatera	0	0	0	0	0	0	0	0	88	228	73	251	263	108	164	120
Macoma balthica	1	0	0	0	1	0	0	1	1	0	1	0	1	4	3	1
Modiolus modiolus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mya arenaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ostracoda:	0	0	0	0	0	0	0	0	2	5	5	15	3	2	1	3
Copepoda:																
Harpacticoid sp. A	1	1	1	0	0	0	0	2	1	2	6	14	9	10	3	13
Harpacticoid sp. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 7. Numbers of individuals in low (L1-4) and high (H1-4) intertidal mudflat cores -- October 1989.

	Otter Cove (Number of Individuals)								Thompson Island (Number of Individuals)							
Species	L1	L2	L3	L4	H1	H2	H3	H4	L1	L2	L3	L4	H1	H2	H3	H4
Turbellaria:	0	0	0	0	0	0	0	0	7	8	7	4	4	10	5	4
Oligochaeta:	135	86	94	179	144	179	297	100	65	334	203	122	375	374	191	285
Polychaeta:																
Aglaophamus circinata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aglaophamus neotenus	0	0	1	4	0	0	0	0	0	1	0	1	0	0	0	0
Capitella capitata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaetozone setosa	0	0	0	0	0	0	0	0	256	142	192	185	16	43	26	32
Eteone heteropoda	0	0	0	2	0	0	0	0	4	7	5	2	2	11	4	3
Eteone longa	0	0	0	2	0	0	0	0	57	30	29	39	25	24	33	24
Flabelligera affinis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glycera sp.	0	0	1	0	0	0	1	0	0	3	1	3	2	2	2	0
Gonlada norvegica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harmothoe oerstedi	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteromastus filiformis	2	0	1	5	2	0	0	0	12	34	22	14	28	28	22	25
Microphthalmus sczelkowii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephtys caeca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nereis diversicolor	0	0	0	1	2	0	1	0	0	0	0	0	0	0	0	0
Nereis virens	9	7	3	7	3	4	9	4	5	2	5	3	2	3	1	5
Ophelina acuminata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllodoce maculata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllodoce mucosa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polydora ligni	14	4	14	14	1	3	4	1	22	9	9	49	2	4	29	1
Polynoidae sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pygospio elegans	0	0	1	2	0	0	0	0	23	16	17	49	6	28	12	14
Scolelepis squamatus	0	0	0	0	0	0	0	0	0	0	1	0	0	3	3	1
Scolocolepides viridis	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Scoloplos armiger	0	0	0	0	0	0	0	0	66	48	41	21	30	23	25	25
Streblospio benedicti	26	13	38	82	16	18	32	15	136	167	128	164	66	210	63	134
Syllidae sp. A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gastropoda:																
Hydrobia minuta	0	0	0	0	0	0	0	0	201	17	108	219	252	106	140	127
Littorina obtusata	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Margarites costalis	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bivalvia:																
Astarte subaequilatera	0	0	0	0	0	0	0	0	113	78	72	57	98	208	171	246
Macoma balthica	0	0	1	0	1	2	1	0	0	0	0	0	0	0	1	2
Modiolus modiolus	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Mya arenaria	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Ostracoda:	0	0	0	0	0	0	0	0	3	1	1	0	0	5	27	4
Copepoda:																
Harpacticoid sp. A	2	0	0	1	0	4	1	0	1	8	16	3	4	10	0	5
Harpacticoid sp. B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Table 7 (cont.). Numbers of individuals in low (L1-4) and high (H1-4) intertidal mudflat cores -- October 1989.

Species	Otter Cove (Number of Individuals)								Thompson Island (Number of Individuals)							
	L1	L2	L3	L4	H1	H2	H3	H4	L1	L2	L3	L4	H1	H2	H3	H4
Cumacea:																
Oxyurostylis smithi	0	0	0	0	0	0	0	0	1	10	8	9	0	2	1	0
Isopoda:																
Chiridotea coeca	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Jaera marina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amphipoda:																
Ampelisca ?vadorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophium volutator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corophium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gammarus mucronatus	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Harpinia propinqua	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0
Marinogammarus finmarchius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marinogammarus obtusatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orchestia grillus	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Pontogeneia inermis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decapoda:																
Crangon septemspinosa	3	3	1	2	1	3	0	1	0	0	0	0	0	0	0	0
Holothuria	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	0
Sipuncula:																
Golfingia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hemichordata:																
Saccoglossus kowalewskyi	0	0	0	0	0	0	0	0	0	1	4	0	2	1	2	5
Total Numbers	192	114	155	301	170	213	348	122	972	916	866	946	912	1098	758	938
Number of Species	8	6	10	12	8	7	10	6	16	20	21	19	16	22	21	19
Shannon Index of Diversity (H')	0.43	0.38	0.48	0.52	0.27	0.29	0.26	0.28	0.90	0.86	0.91	0.93	0.73	0.85	0.94	0.83
Pielou Index of Evenness (e)	0.48	0.49	0.48	0.48	0.30	0.34	0.26	0.36	0.75	0.66	0.69	0.73	0.61	0.64	0.71	0.65

Table 8. Sample means (± standard error) for the low intertidal cores from Otter Cove.

Species	October 1987	October 1988	June 1989	July 1989	October 1989
Turbellaria:	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Oligochaeta:	492.3 (88.3)	321.0 (83.9)	296.5 (22.1)	143.8 (38.6)	123.5 (21.4)
Polychaeta:					
Aglaophamus circinata	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)
Aglaophamus neotenus	0.0 (0.0)	1.0 (0.7)	0.0 (0.0)	0.8 (0.3)	1.3 (0.9)
Capitella capitata	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)
Chaetozone setosa	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Eteone heteropoda	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.5 (0.5)
Eteone longa	0.3 (0.3)	1.5 (0.9)	0.8 (0.5)	1.8 (0.6)	0.5 (0.5)
Flabelligera affinis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Glycera sp.	0.0 (0.0)	0.8 (0.5)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)
Goniada norvegica	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Harmothoe oerstedi	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)
Heteromastus filiformis	1.0 (0.6)	0.8 (0.5)	0.3 (0.3)	0.3 (0.3)	2.0 (1.1)
Microphthalmus sczelkowii	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Nephtys caeca	0.5 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Nereis diversicolor	7.5 (1.8)	1.8 (0.6)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)
Nereis virens	8.0 (1.1)	7.5 (2.4)	2.8 (0.8)	7.0 (1.8)	6.5 (1.3)
Ophelina acuminata	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Phyllodoce maculata	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Phyllodoce mucosa	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Polydora ligni	4.0 (1.8)	24.5 (5.2)	4.8 (2.1)	4.0 (1.6)	11.5 (2.5)
Polynoidae sp. A	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Pygospio elegans	0.0 (0.0)	0.5 (0.3)	2.0 (1.0)	2.0 (0.4)	0.8 (0.5)
Scoletepis squamatus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Scolocolepides viridis	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Scoloplos armiger	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Streblospio benedicti	208.3 (29.1)	62.8 (6.6)	40.3 (4.2)	23.0 (5.1)	39.8 (15.0)
Syllidae sp. A	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Gastropoda:					
Hydrobia minuta	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Littorina obtusata	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Margarites costalis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)
Bivalvia:					
Astarte subaequilatera	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Macoma balthica	0.5 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)	0.3 (0.3)
Modiolus modiolus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Mya arenaria	0.8 (0.3)	1.0 (0.7)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Ostracoda:	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Copepoda:					
Harpacticoid sp. A	3.8 (1.8)	7.5 (1.0)	2.0 (0.7)	0.8 (0.3)	0.8 (0.5)
Harpacticoid sp. B	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Cumacea:					
Oxyurostylis smithi	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)

Table 8 (cont.). Sample means (± standard error) for the low intertidal cores from Otter Cove.

Species	October 1987	October 1988	June 1989	July 1989	October 1989
Isopoda:					
Chiridotea coeca	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Jaera marina	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Amphipoda:					
Ampelisca ?vadorum	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Corophium volutator	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Corophium sp.	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Gammarus mucronatus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Harpinia propinqua	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Marinogammarus finmarchius	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Marinogammarus obtusatus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Orchestia grillus	0.0 (0.0)	0.0 (0.0)	1.8 (0.9)	0.0 (0.0)	0.0 (0.0)
Pontogenela inermis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Decapoda:					
Crangon septemspinosa	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	2.3 (0.5)
Holothuria	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Sipuncula:					
Golfingia sp.	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Hemichordata:					
Saccoglossus kowalewskyi	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Total Numbers	727.0 (116.2)	431.0 (84.1)	351.8 (18.6)	183.8 (44.1)	190.5 (40.1)
Number of Species	8.3 (0.5)	9.3 (0.9)	8.3 (0.5)	7.8 (0.6)	9.0 (1.3)
Shannon Index of Diversity (H')	0.35 (0.01)	0.41 (0.06)	0.26 (0.03)	0.37 (0.04)	0.45 (0.03)
Pielou Index of Evenness (e)	0.38 (0.01)	0.42 (0.05)	0.28 (0.02)	0.42 (0.07)	0.48 (0.00)

Table 9. Sample means (± standard error) for the high intertidal cores from Otter Cove.

Species	October 1987	October 1988	June 1989	July 1989	October 1989
Turbellaria:	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Oligochaeta:	234.0 (69.5)	348.8 (53.9)	190.5 (35.6)	308.8 (93.4)	180.0 (42.2)
Polychaeta:					
Aglaophamus circinata	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Aglaophamus neotenus	0.8 (0.5)	0.8 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Capitella capitata	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Chaetozone setosa	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Eteone heteropoda	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Eteone longa	1.5 (0.5)	0.3 (0.3)	0.3 (0.3)	1.3 (0.5)	0.0 (0.0)
Flabelligera affinis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Glycera sp.	0.3 (0.3)	0.5 (0.3)	0.0 (0.0)	0.3 (0.3)	0.3 (0.3)
Goniada norvegica	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Harmothoe oerstedi	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Heteromastus filiformis	1.0 (0.4)	0.0 (0.0)	0.3 (0.3)	0.3 (0.3)	0.5 (0.5)
Microphthalmus sczelkowii	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Nephtys caeca	0.3 (0.3)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Nereis diversicolor	0.0 (0.0)	1.5 (1.0)	0.3 (0.3)	0.0 (0.0)	0.8 (0.5)
Nereis virens	5.3 (1.7)	5.0 (1.3)	2.3 (0.3)	8.0 (2.6)	5.0 (1.4)
Ophelina acuminata	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Phyllodoce maculata	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Phyllodoce mucosa	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Polydora ligni	10.0 (2.1)	12.8 (2.2)	3.0 (0.8)	3.8 (1.1)	2.3 (0.8)
Polynoidae sp. A	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Pygospio elegans	0.5 (0.3)	0.8 (0.3)	1.8 (0.3)	2.5 (0.6)	0.0 (0.0)
Scolelepis squamatus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Scolocolepides viridis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Scoloplos armiger	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Streblospio benedicti	101.3 (10.3)	99.5 (13.6)	13.0 (3.2)	41.0 (12.1)	20.3 (4.0)
Syllidae sp. A	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Gastropoda:					
Hydrobia minuta	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Littorina obtusata	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Margarites costalis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Bivalvia:					
Astarte subaequilatera	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Macoma balthica	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.5 (0.3)	1.0 (0.4)
Modiolus modiolus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Mya arenaria	0.5 (0.3)	1.3 (0.6)	0.8 (0.5)	0.0 (0.0)	0.5 (0.3)
Ostracoda:	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Copepoda:					
Harpacticoid sp. A	2.8 (1.5)	4.3 (2.7)	0.0 (0.0)	0.5 (0.5)	1.3 (0.9)
Harpacticoid sp. B	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Cumacea:					
Oxyurostylis smithi	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)

Table 9 (cont.). Sample means (± standard error) for the high intertidal cores from Otter Cove.

Species	October 1987	October 1988	June 1989	July 1989	October 1989
Isopoda:					
Chiridotea coeca	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Jaera marina	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Amphipoda:					
Ampelisca ?vadorum	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Corophium volutator	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Corophium sp.	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Gammarus mucronatus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Harpinia propinqua	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Marinogammarus finmarchius	0.0 (0.0)	0.3 (0.3)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)
Marinogammarus obtusatus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Orchestia grillus	0.0 (0.0)	1.0 (0.4)	0.5 (0.3)	0.0 (0.0)	0.3 (0.3)
Pontogenela inermis	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Decapoda:					
Crangon septemspinosa	1.5 (1.5)	0.3 (0.3)	0.3 (0.3)	0.0 (0.0)	1.3 (0.6)
Holothuria	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Sipuncula:					
Golfingia sp.	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Hemichordata:					
Saccoglossus kowalewskyi	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Total Numbers	360.0 (75.3)	477.3 (62.2)	213.0 (37.3)	366.8 (107.2)	213.3 (48.6)
Number of Species	9.3 (1.0)	9.8 (1.5)	7.3 (0.5)	7.0 (0.9)	7.8 (0.9)
Shannon Index of Diversity (H')	0.40 (0.03)	0.36 (0.04)	0.21 (0.03)	0.26 (0.02)	0.28 (0.01)
Pielou Index of Evenness (e)	0.42 (0.03)	0.37 (0.02)	0.25 (0.02)	0.32 (0.04)	0.32 (0.02)

Table 10. Sample means (± standard error) for the low intertidal cores from Thompson Island.

Species	October 1987	October 1988	June 1989	July 1989	October 1989
Turbellaria:	3.5 (2.4)	4.3 (0.6)	0.8 (0.8)	1.3 (0.5)	6.5 (0.9)
Oligochaeta:	351.5 (54.1)	273.3 (60.3)	400.0 (30.1)	436.5 (81.0)	181.0 (58.3)
Polychaeta:					
Aglaophamus circinata	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)
Aglaophamus neotenus	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.5 (0.3)
Capitella capitata	0.0 (0.0)	0.0 (0.0)	1.0 (0.7)	1.8 (1.2)	0.0 (0.0)
Chaetozone setosa	20.0 (2.9)	5.8 (2.9)	33.0 (16.4)	10.0 (3.1)	193.8 (23.5)
Eteone heteropoda	1.0 (0.7)	2.0 (1.1)	0.8 (0.3)	0.5 (0.3)	4.5 (1.0)
Eteone longa	12.8 (2.1)	0.3 (0.3)	0.3 (0.3)	51.3 (5.0)	38.8 (6.5)
Flabelligera affinis	0.0 (0.0)	0.5 (0.5)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Glycera sp.	3.5 (0.5)	8.5 (1.3)	3.8 (1.3)	3.5 (0.6)	1.8 (0.8)
Goniada norvegica	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)
Harmothoe oerstedi	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Heteromastus filiformis	18.3 (4.3)	15.8 (4.2)	8.5 (4.5)	15.3 (2.9)	20.5 (5.0)
Microphthalmus sczelkowii	0.5 (0.3)	1.0 (0.4)	3.3 (1.4)	0.0 (0.0)	0.0 (0.0)
Nephtys caeca	0.0 (0.0)	0.0 (0.0)	0.5 (0.5)	0.0 (0.0)	0.0 (0.0)
Nereis diversicolor	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Nereis virens	3.0 (0.7)	1.5 (0.9)	8.3 (5.1)	36.8 (16.0)	3.8 (0.8)
Ophelina acuminata	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Phyllodoce maculata	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Phyllodoce mucosa	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Polydora ligni	52.5 (27.2)	84.0 (13.8)	17.3 (2.5)	10.0 (2.7)	22.3 (9.4)
Polynoidae sp. A	0.8 (0.8)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Pygospio elegans	6.5 (2.5)	34.0 (14.3)	65.3 (18.1)	13.0 (1.6)	26.3 (7.7)
Scoletepis squamatus	0.0 (0.0)	1.5 (0.9)	0.8 (0.5)	0.3 (0.3)	0.3 (0.3)
Scolocolepides viridis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)
Scoloplos armiger	17.3 (4.0)	8.5 (2.6)	7.3 (1.6)	6.5 (2.7)	44.0 (9.3)
Streblospio benedicti	181.0 (14.2)	140.8 (25.9)	196.8 (38.7)	105.8 (17.3)	148.8 (9.8)
Syllidae sp. A	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Gastropoda:					
Hydrobia minuta	91.3 (28.3)	28.8 (15.5)	51.0 (4.5)	18.3 (9.3)	136.3 (46.6)
Littorina obtusata	0.0 (0.0)	0.8 (0.8)	0.0 (0.0)	0.3 (0.3)	0.3 (0.3)
Margarites costalis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Bivalvia:					
Astarte subaequilatera	133.5 (23.8)	50.5 (4.0)	26.8 (4.4)	160.0 (46.2)	80.0 (11.9)
Macoma balthica	0.3 (0.3)	3.3 (2.9)	0.5 (0.3)	0.5 (0.3)	0.0 (0.0)
Modiolus modiolus	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)
Mya arenaria	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)
Ostracoda:	0.0 (0.0)	1.0 (0.7)	0.5 (0.3)	6.8 (2.8)	1.3 (0.6)
Copepoda:					
Harpacticoid sp. A	16.8 (11.7)	9.5 (2.2)	15.8 (6.3)	5.8 (3.0)	7.0 (3.3)
Harpacticoid sp. B	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Cumacea:					
Oxyurostylis smithi	1.3 (0.9)	1.0 (0.4)	0.0 (0.0)	0.5 (0.3)	7.0 (2.0)

Table 10 (cont.). Sample means (± standard error) for the low intertidal cores from Thompson Island.

Species	October 1987	October 1988	June 1989	July 1989	October 1989
Isopoda:					
Chiridotea coeca	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)
Jaera marina	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Amphipoda:					
Ampelisca ?vadorum	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Corophium volutator	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Corophium sp.	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)
Gammarus mucronatus	1.5 (1.0)	0.0 (0.0)	1.3 (0.5)	1.8 (0.5)	0.0 (0.0)
Harpinia propinqua	4.8 (1.5)	1.8 (1.4)	1.3 (0.5)	0.5 (0.3)	0.0 (0.0)
Marinogammarus finmarchius	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Marinogammarus obtusatus	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Orchestia grillus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Pontogenela inermis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Decapoda:					
Crangon septemspinosa	1.5 (1.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Holothuria	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.8 (0.8)
Sipuncula:					
Golfingia sp.	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Hemichordata:					
Saccoglossus kowalewskyi	0.0 (0.0)	0.8 (0.3)	1.3 (0.5)	1.8 (0.5)	1.3 (0.9)
Total Numbers	923.0 (141.0)	678.5 (107.9)	845.3 (106.0)	886.8 (168.4)	925.0 (22.8)
Number of Species	17.8 (0.8)	19.0 (1.1)	19.0 (0.4)	20.0 (0.9)	19.0 (1.1)
Shannon Index of Diversity (H')	0.80 (0.03)	0.80 (0.04)	0.71 (0.01)	0.72 (0.01)	0.90 (0.01)
Pielou Index of Evenness (e)	0.64 (0.01)	0.63 (0.02)	0.55 (0.01)	0.56 (0.00)	0.71 (0.02)

Table 11. Sample means (± standard error) for the high intertidal cores from Thompson Island.

Species	October 1987	October 1988	June 1989	July 1989	October 1989
Turbellaria:	10.0 (2.9)	8.0 (1.9)	3.0 (1.3)	1.5 (0.6)	5.8 (1.4)
Oligochaeta:	490.8 (90.6)	466.5 (23.7)	699.5 (147.9)	341.3 (50.0)	306.3 (43.8)
Polychaeta:					
Aglaophamus circinata	0.5 (0.3)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)
Aglaophamus neotenus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)
Capitella capitata	0.0 (0.0)	0.0 (0.0)	2.5 (1.9)	0.3 (0.3)	0.0 (0.0)
Chaetozone setosa	6.8 (2.1)	44.3 (10.4)	22.3 (3.9)	24.8 (1.7)	29.3 (5.6)
Eteone heteropoda	1.3 (0.9)	0.8 (0.5)	0.8 (0.5)	2.8 (0.8)	5.0 (2.0)
Eteone longa	1.8 (0.8)	5.5 (2.9)	2.8 (0.5)	62.0 (3.6)	26.5 (2.2)
Flabelligera affinis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Glycera sp.	20.8 (2.4)	3.5 (0.6)	1.8 (0.6)	3.3 (0.5)	1.5 (0.5)
Goniada norvegica	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Harmothoe oerstedi	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Heteromastus filiformis	18.8 (1.3)	16.8 (3.4)	14.3 (2.4)	12.8 (1.8)	25.8 (1.4)
Microphthalmus sczelkowii	3.8 (1.9)	0.5 (0.3)	2.0 (1.1)	0.3 (0.3)	0.0 (0.0)
Nephtys caeca	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)
Nereis diversicolor	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Nereis virens	3.5 (1.3)	1.5 (1.0)	12.8 (8.8)	78.0 (11.7)	2.8 (0.9)
Ophelina acuminata	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Phyllodoce maculata	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Phyllodoce mucosa	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Polydora ligni	265.3 (30.0)	80.0 (23.2)	3.8 (0.3)	6.8 (4.1)	9.0 (6.7)
Polynoidae sp. A	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Pygospio elegans	18.0 (7.4)	30.0 (6.1)	35.5 (1.8)	22.8 (2.6)	15.0 (4.7)
Scoletepis squamatus	0.0 (0.0)	1.0 (0.6)	0.5 (0.3)	0.3 (0.3)	1.8 (0.8)
Scolocolepides viridis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Scoloplos armiger	5.3 (0.5)	25.3 (6.6)	15.5 (4.7)	18.3 (2.7)	25.8 (1.5)
Streblospio benedicti	103.3 (18.6)	184.0 (17.6)	210.8 (32.2)	176.5 (50.7)	118.3 (34.7)
Syllidae sp. A	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Gastropoda:					
Hydrobia minuta	66.0 (33.0)	112.8 (28.0)	33.3 (7.3)	34.5 (5.0)	156.3 (32.7)
Littorina obtusata	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)
Margarites costalis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Bivalvia:					
Astarte subaequilatera	99.0 (33.4)	129.0 (14.2)	35.8 (2.9)	163.8 (35.2)	180.8 (31.5)
Macoma balthica	0.0 (0.0)	11.0 (4.8)	1.5 (0.6)	2.3 (0.8)	0.8 (0.5)
Modiolus modiolus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Mya arenaria	0.8 (0.5)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Ostracoda:	2.8 (1.5)	1.5 (0.6)	0.8 (0.3)	2.3 (0.5)	9.0 (6.1)
Copepoda:					
Harpacticoid sp. A	32.0 (12.6)	24.5 (4.1)	6.0 (2.0)	8.8 (2.1)	4.8 (2.1)
Harpacticoid sp. B	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)
Cumacea:					
Oxyurostylis smithi	0.3 (0.3)	0.5 (0.5)	0.0 (0.0)	0.5 (0.3)	0.8 (0.5)

Table 11 (cont.). Sample means (± standard error) for the high intertidal cores from Thompson Island.

Species	October 1987	October 1988	June 1989	July 1989	October 1989
Isopoda:					
Chiridotea coeca	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Jaera marina	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Amphipoda:					
Ampelisca ?vadorum	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Corophium volutator	0.5 (0.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Corophium sp.	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Gammarus mucronatus	0.5 (0.3)	1.0 (0.7)	0.3 (0.3)	1.3 (0.5)	0.5 (0.5)
Harpinia propinqua	17.5 (8.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.8 (0.5)
Marinogammarus finmarchius	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Marinogammarus obtusatus	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Orchestia grillus	2.0 (0.4)	0.0 (0.0)	0.0 (0.0)	1.3 (0.8)	0.0 (0.0)
Pontogeneia inermis	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Decapoda:					
Crangon septemspinosa	1.0 (0.7)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Holothuria	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.0 (1.0)
Sipuncula:					
Golfingia sp.	0.0 (0.0)	0.0 (0.0)	0.3 (0.3)	0.0 (0.0)	0.0 (0.0)
Hemichordata:					
Saccoglossus kowalewskyi	0.5 (0.3)	0.0 (0.0)	1.3 (0.5)	2.8 (1.4)	2.5 (0.9)
Total Numbers	1173.0 (195.6)	1148.5 (13.8)	1105.3 (171.1)	966.3 (128.5)	926.5 (69.6)
Number of Species	22.5 (1.0)	18.0 (0.7)	18.8 (0.5)	20.3 (0.3)	19.5 (1.3)
Shannon Index of Diversity (H')	0.78 (0.04)	0.82 (0.01)	0.58 (0.04)	0.86 (0.03)	0.84 (0.04)
Pielou Index of Evenness (e)	0.57 (0.02)	0.66 (0.01)	0.45 (0.03)	0.66 (0.02)	0.65 (0.02)

Table 12. Similarity matrix for all intertidal mudflat samples. The Czekanowski coefficient, calculated from the natural log of species abundances + 1, was used as the measure of similarity.

		Otter Cove -- Low					Otter Cove -- High					Thompson Island -- Low					Thompson Island -- High				
		Oct 87	Oct 88	Jun 89	Jul 89	Oct 89	Oct 87	Oct 88	Jun 89	Jul 89	Oct 89	Oct 87	Oct 88	Jun 89	Jul 89	Oct 89	Oct 87	Oct 88	Jun 89	Jul 89	Oct 89
	Oct 87	0.80	0.73	0.70	0.70	0.80	0.81	0.68	0.76	0.76	0.46	0.45	0.53	0.49	0.41	0.43	0.44	0.53	0.46	0.43
Otter Cove	Oct 88		0.75	0.77	0.78	0.86	0.87	0.67	0.79	0.73	0.52	0.50	0.55	0.52	0.49	0.49	0.49	0.52	0.49	0.46
Low	Jun 89			0.84	0.75	0.79	0.78	0.80	0.88	0.75	0.46	0.46	0.47	0.48	0.41	0.44	0.42	0.49	0.47	0.44
	Jul 89				0.82	0.80	0.72	0.80	0.90	0.77	0.43	0.41	0.45	0.46	0.41	0.39	0.40	0.48	0.44	0.41
	Oct 89					0.85	0.76	0.70	0.79	0.77	0.47	0.45	0.49	0.47	0.43	0.43	0.42	0.47	0.44	0.42
	Oct 87						0.85	0.70	0.81	0.79	0.51	0.48	0.52	0.51	0.47	0.47	0.46	0.52	0.48	0.47
Otter Cove	Oct 88							0.73	0.75	0.74	0.48	0.47	0.52	0.49	0.45	0.47	0.44	0.49	0.47	0.44
High	Jun 89								0.79	0.80	0.37	0.37	0.39	0.37	0.34	0.36	0.35	0.39	0.36	0.35
	Jul 89									0.78	0.46	0.45	0.49	0.50	0.41	0.41	0.43	0.52	0.46	0.44
	Oct 89										0.40	0.39	0.42	0.40	0.35	0.37	0.36	0.43	0.39	0.37
	Oct 87											0.80	0.80	0.80	0.81	0.81	0.86	0.78	0.81	0.82
Thompson Island	Oct 88												0.81	0.76	0.77	0.80	0.84	0.81	0.78	0.78
Low	Jun 89													0.79	0.75	0.76	0.81	0.87	0.80	0.76
	Jul 89														0.78	0.74	0.78	0.82	0.89	0.84
	Oct 89															0.72	0.82	0.78	0.82	0.87
	Oct 87																0.80	0.73	0.73	0.74
Thompson Island	Oct 88																	0.81	0.82	0.84
High	Jun 89																		0.84	0.79
	Jul 89																			0.85
	Oct 89																			

Table 13. Cumulative species list for all mudflat samples: Otter Cove. Numbers indicate the total sampling dates each species was collected (maximum 5) and in parentheses, the number of October sampling dates (maximum 3); absence of a number indicates the species was not present.

Species	Low	High
Oligochaeta:	5 (3)	5 (3)
Polychaeta:		
Aglaophamus circinata	1 (0)	
Aglaophamus neotenus	3 (2)	2 (2)
Capitella capitata	1 (0)	
Eteone heteropoda	2 (1)	
Eteone longa	5 (3)	4 (2)
Glycera sp.	2 (2)	4 (3)
Harmothoe oerstedi	1 (1)	
Heteromastus filiformis	5 (3)	4 (2)
Nephtys caeca	1 (1)	2 (2)
Nereis diversicolor	3 (3)	3 (2)
Nereis virens	5 (3)	5 (3)
Polydora ligni	5 (3)	5 (3)
Pygospio elegans	4 (2)	4 (2)
Scolocolepides viridis	1 (1)	
Streblospio benedicti	5 (3)	5 (3)
Gastropoda:		
Margarites costalis	1 (1)	
Bivalvia:		
Macoma balthica	5 (3)	3 (2)
Mya arenaria	2 (2)	4 (3)
Copepoda:		
Harpacticoid sp. A	5 (3)	4 (3)
Isopoda:		
Jaera marina		1 (1)
Amphipoda:		
Marinogammarus finmarchius		2 (1)
Orchestia grillus	1 (0)	3 (2)
Pontogeneia inermis		1 (1)
Decapoda:		
Crangon septemspinosa	2 (2)	4 (3)

Table 13 (cont.). Cumulative species list for all mudflat samples: Thompson Island.

Species	Low	High
Turbellaria:	5 (3)	5 (3)
Oligochaeta:	5 (3)	5 (3)
Polychaeta:		
Aglaophamus circinata	2 (1)	2 (2)
Aglaophamus neotenus	2 (1)	1 (0)
Capitella capitata	2 (0)	2 (0)
Chaetozone setosa	5 (3)	5 (3)
Eteone heteropoda	5 (3)	5 (3)
Eteone longa	5 (3)	5 (3)
Flabelligera affinis	1 (1)	
Glycera sp.	5 (3)	5 (3)
Goniada norvegica	1 (0)	
Heteromastus filiformis	5 (3)	5 (3)
Microphthalmus sczelkowii	3 (2)	4 (2)
Nephtys caeca	1 (0)	1 (0)
Nereis virens	5 (3)	5 (3)
Ophelina acuminata		1 (1)
Phyllodoce maculata		1 (1)
Phyllodoce mucosa		1 (1)
Polydora ligni	5 (3)	5 (3)
Polynoidae sp. A	1 (1)	
Pygospio elegans	5 (3)	5 (3)
Scolelepis squamatus	4 (2)	4 (2)
Scolocolepides viridis	1 (1)	
Scoloplos armiger	5 (3)	5 (3)
Streblospio benedicti	5 (3)	5 (3)
Syllidae sp. A		1 (1)
Gastropoda:		
Hydrobia minuta	5 (3)	5 (3)
Littorina obtusata	3 (2)	2 (2)
Bivalvia:		
Astarte subaequilatera	5 (3)	5 (3)
Macoma balthica	4 (2)	4 (2)
Modiolus modiolus	2 (2)	
Mya arenaria	1 (0)	2 (2)
Ostracoda:	4 (2)	5 (3)
Copepoda:		
Harpacticoid sp. A	5 (3)	5 (3)
Harpacticoid sp. B		2 (2)
Cumacea:		
Oxyurostylis smithi	4 (3)	4 (3)
Isopoda:		
Chiridotea coeca	1 (1)	
Amphipoda:		
Ampelisca ?vadorum		1 (1)
Corophium volutator		1 (1)
Corophium sp.	1 (0)	
Gammarus mucronatus	3 (1)	5 (3)
Harpinia propinqua	4 (2)	2 (2)
Marinogammarus obtusatus	1 (1)	
Orchestia grillus		2 (1)
Decapoda:		
Crangon septemspinosa	1 (1)	1 (1)
Holothuria	1 (1)	1 (1)
Sipuncula:		
Golfingia sp.		1 (0)
Hemichordata:		
Saccoglossus kowalewskyi	4 (2)	4 (2)

APPENDIX I:

TAXONOMIC REFERENCES

The following is a list of useful references to the taxonomy and identification of marine macrofauna from the Acadia Park region:

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