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The Macroinvertebrate Fauna Associated with the Mud Flats of the Gulf of Maine[1]

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ABSTRACT

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Mud flats are a dominant habitat in the Gulf of Maine and are of significant economic and ecological importance to the region. This communication describes the macroinvertebrate fauna (> 1.0 mm) of five representative mud flats along 300 km of coastline in the central and northern Gulf of Maine. Arthropods and annelids were the most diverse taxa encountered, but annelids and molluscs were the numerical dominants. Numbers of species at each site ranged from 19 to 43. Density ranged from 624 to over 52,000 individuals m^{-2} with an overall mean of 7,345 m^{-2}. Numerical analyses showed that the mud flats of the Gulf of Maine are numerically dominated by a few widely distributed, deposit-feeding species. This is in contrast to previous results of sand flat and sand beach investigations which manifested faunistic heterogeneity and distinct community partitioning, respectively, over the same geographical range. The most characteristic mud flat taxa include oligochaetes, the molluscs *Hydrobia truncata* and *Macoma balthica*, the polychaetes *Streblospio benedicti* and *Nereis virens* and the amphipod *Corophium volutator*. With the exception of *S. benedicti*, these species are characteristic of similar environments in northwestern Europe and, with the exception of *C. volutator* which has a very limited distribution in the western hemisphere, they are also widely distributed in the northwest Atlantic.

ADDITIONAL INDEX WORDS: *Gulf of Maine, intertidal studies, fine-grained flats, mud flats, macroinvertebrate fauna.*

INTRODUCTION

Mud flats are fine-grained habitats characteristic of estuaries, coves, inlets and other protected, low-energy environments. Sediments consist of various proportions of silt, clay, fine sand and organic material and, except in the immediate vicinity of burrows, the flats are usually anoxic below the sediment surface. Mud flats are a dominant intertidal habitat along the northern Gulf of Maine coast, accounting for 27% of the intertidal area and ranking second only to bedrock shores in terms of linear extent (MAINE STATE PLANNING OFFICE, 1983).

Economically and ecologically, mud flats are extremely important to the Gulf of Maine region. In terms of landings value, two of the four most important fisheries in the State of Maine, clams and bait worms, occur almost exclusively on mud flats. The flats are also of economic importance as feeding areas for commercial finfish species (TYLER, 1971; WELLS *et al.*, 1973). Mud flats are a significant habitat for shorebirds and the flats of eastern Maine and southwestern New Brunswick serve as major migratory staging areas for several species of shorebirds (U.S. FISH and WILDLIFE SERVICE, 1980). This has stimulated research on several aspects of shorebird feeding (HICKLIN and SMITH, 1979; 1984; GRATTO *et al.*, 1984; others) and on the biology of significant prey species (BOATES and SMITH, 1979; GRATTO *et al.*, 1983; PEER *et al.*, 1986; others). The expansive and accessible mud flats of the Gulf of Maine region have also been used to good advantage for manipulative ecological experimentation on factors determining macrofaunal community structure (COMMITO, 1982; AMBROSE, 1984a,b; WILSON, 1988).

Due to their fine-grained, low energy nature, mud flats are particularly susceptible to the

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accumulation of toxic chemicals introduced locally from municipal sewage and industry (LARSEN *et al.*, 1983a,b; 1984) or from afar through atmospheric transport (JOHNSON *et al.*, 1985; LARSEN *et al.*, 1986). In addition, the advent of global sea level rise and/or the development of the tidal power resources of the Bay of Fundy (U.S. ENVIRONMENTAL PROTECTION AGENCY 1983; GREENBERG, 1979; LARSEN, 1981) will certainly have far-reaching consequences for sedimentary environments such as mud flats.

The above studies were narrowly focused on specific processes or species and few addressed the information needs of environmental planning, impact assessment or zoogeographic issues related to the ecologically rich and complex Gulf of Maine ecosystem. The purposes of the present study are to document the composition of mud flat macrofauna of the northern Gulf of Maine and to evaluate any faunistic regionalization as has been postulated or demonstrated elsewhere (BOUSFIELD and THOMAS, 1975; LARSEN and DOGGETT, 1990). This effort is one phase of a larger study to characterize the macrofauna associated with the principal intertidal habitats of the region as detailed in intertidal sediment maps produced by the Maine Geological Survey (TIMSON, 1977).

METHODS

Five mud flats characteristic of northern Gulf of Maine mud flats were chosen for study (Figure 1). The sites selected and the dates of sampling were: Kittery Point, Kittery (July 29, 1976); Mussel Cove, Falmouth (May 15, 1975); Hodgdon Cove, Boothbay Harbor (May 8, 1975); East Friendship (June 3, 1975); and Addison (June 21, 1976).

The flats were sampled as close to spring tides as was practical. Two transects were placed at each site. Four stations were occupied along each transect with the lowest station located at the low tide line and the highest station at the level of the previous high tide (tides are semidiurnal). Intermediate stations were placed so as to dissect the transects into equal vertical segments. At each station a one-quarter meter squared quadrat with metal sides was driven into the sediment and the enclosed area dug out to a depth of 15 to 20 cm (HOLME and MCINTYRE, 1984). The sediment samples were transported in buckets to the laboratory or field station and sieved on a 1.0 mm screen on the day of sampling. The material remaining on the screen was fixed in 10% formalin containing the vital stain Rose Bengal. In the laboratory, the samples were preserved in 70% ethanol and all organisms were removed, identified to the lowest taxonomic level practical (usually the species level), and counted. No attempt was made to identify nemerteans, nematodes, oligochaetes and insects to the species level.

Numerical data analyses included informational diversity (Shannon-Weaver's H′) and its components, calculated by standard formulas given by MARGALEF (1958) and PIELOU (1970). A cluster analysis of summed site data was accomplished employing the Canberra metric index and the flexible sorting clustering strategy (see CLIFFORD and STEPHENSON, 1975 for details). Data were log-transformed and species occurring at only one site were eliminated from this analysis. A bioindex ranking, in which elements of both abundance and frequency of occurrence can be incorporated into one measure, was employed (FAGER, 1957; SANDERS, 1960). Numerical analyses were limited to noncolonial species.

RESULTS AND DISCUSSION

A total of 75 species was encountered in the 39 samples (one sample from Kittery was damaged) from the five mud flats (Table 1). Arthropods accounted for 36% and annelids for 35% of the species. Molluscs and the miscellaneous grouping accounted for 23 and 7% of the species, respectively. In contrast, numerical dominance was shared by the annelids and molluscs which accounted for 48 and 43%, respectively, of the total number of individuals encountered. Arthropods and the miscellaneous phyla contained only 4 and 5% of the total individuals, respectively.

The five mudflats, sampled along 300 km of coastline, displayed a remarkable similarity in terms of informational diversity on a station basis and site average basis (Table 2). This is especially true for the four flats between Kittery and East Friendship, along the south and central coast of Maine, which were also remarkably similar in terms of total numbers of species and species per station (Table 2). Mean values

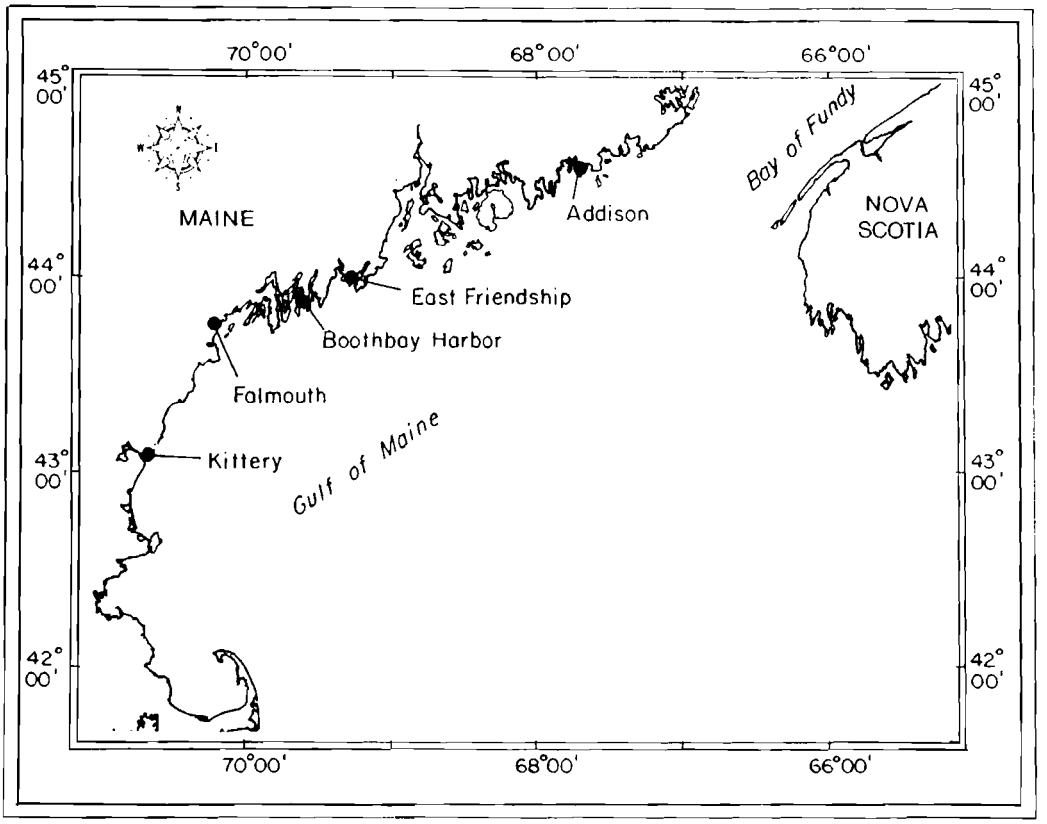

Figure 1. The locations of the mud flats studied in the Gulf of Maine.

and ranges over all stations for the parameters measured were: species diversity 2.33 (1.43-3.78); species per station 17.4 (6-30) and density 7,345/m^2 (624-52,392). On a site average basis, diversity ranged from 1.89 to 2.66, species per site from 19 to 43 and density from 1,050 to 22,322/m^2.

The mud flat at Addison differed somewhat from the others by manifesting the lowest values for diversity, total number of species and less than half the species per station of the other sites (Table 2). In addition, this site supported below average densities. Although sufficient environmental data to draw conclusions on the causes for this observation are not available, perhaps the sampling site in the lower Columbia River estuary was more subject to stress from salinity variations than other sites which were in protected coves not subject to direct freshwater inputs. This speculation is supported by the presence on the Addison mud flat of the low salinity tolerant polychaete, *Nereis diversicolor*, which occurred at a mean density of 88/m^2. This species was found at only one other site during the course of the study (Table 1). The only other outlying observation presented in Table 2 is the very high density observed at the East Friendship site. The density is the result of simultaneous abundance peaks of unidentified oligochaetes (6,620/m^2), the small bivalve *Gemma gemma* (5,976/m^2) and the gastropod *Hydrobia truncata* (5,866/m^2). Whereas the oligochaetes and *H. truncata* were found abundantly at multiple sites, *G. gemma* occurred in abundance only at East Friendship.

Numerical dominance on the mud flats was high. The most abundant species accounted for 29.6 to 59% of the total number of individuals at each site, while the five most abundant species accounted for between 77 and 93% of the total individuals present at each site (Table 3).

Table 1. *Taxa found on Gulf of Maine mudflats.*

	Kittery	Falmouth	Boothbay Harbor	East Friendship	Addison
Phylum Platyhelminthes					
Unidentified Platyhelminthes			+		
Phylum Rhynchocoela					
Unidentified Nemertea		+	+	+	+
Phylum Aschelminthes					
Unidentified Nematoda	+	+	+	+	+
Phylum Mollusca					
Unidentified Gastropoda				+	
Acmaea testudinalis			+		
Hydrobia truncata		+	+	+	+
Littorina littorea	+	+	+	+	
Littorina obtusata			+		
Littorina saxatilis			+	+	
Ilyanassa obsoleta		+		+	
Odostomia bisuturalis				+	
Polinices triseriata				+	
Skeneopsis planorbis			+		
Ensis directus	+				
Gemma gemma			+	+	+
Macoma balthica	+	+	+	+	+
Geukensia demissus				+	
Mya arenaria	+	+	+	+	+
Mytilus edulis	+	+	+	+	+
Tellina agilis	+				
Phylum Annelida					
Eteone heteropoda			+		
Eteone longa	+	+	+	+	
Nephtys caeca	+	+	+	+	+
Nephtys ciliata		+			
Nephtys incisa					+
Exogone hebes	+				
Nereis diversicolor		+			+
Nereis virens	+	+	+	+	+
Heteromastus filiformis	+	+	+	+	
Notomastus latericeus					+
Clymenella torquata	+			+	
Maldanidae sp.	+				
Polydora sp.	+	+	+	+	+
Polydora ligni		+	+	+	
Pygospio elegans		+	+	+	
Spio filicornis	+				
Streblospio benedicti	+	+	+	+	+
Lumbrineris brevipes	+				
Ninoe nigripes	+	+			
Scoloplos sp.	+	+	+	+	+
Tharyx acutus	+	+	+	+	
Ampharete acutifrons	+				
Ampharete arctica		+		+	
Fabricia sabella				+	
Polychaeta A		+			
Oligochaeta	+	+	+	+	+
Phylum Sipuncula					
Sipunculida sp.		+			

Within each site, then, a very few species contained the vast majority of individuals. If these dominant species were found abundantly at a number of sites, it would be possible to generalize about the community structure of the mud flats of the region.

To test the possibility that recurring species were responsible for the high dominance, Table

Table 1. *Continued.*

	Kittery	Falmouth	Boothbay Harbor	East Friendship	Addison
Phylum Arthropoda					
Unidentified Ostracoda	+		+	+	
Balanus balanoides	+	+	+	+	
Leucon nasicoides	+		+		
Oxyurostylis smithi	+				
Leptochelia rapax		+		+	
Jaera sp.	+		+	+	
Ampelisca abdita	+	+	+	+	
Microdeutopus gryllotalpa	+				
Corophium volutator		+	+	+	+
Gammarus lawrencianus		+			
Gammarus mucronatus	+	+	+	+	
Gammarus oceanicus		+	+		
Marinogammarus finmarchicus			+		
Psammonyx nobilis				+	
Phoxocephalus holbolli	+	+			
Pontogeneia inermis			+		
Orchestia platensis	+			+	
Carcinus maenas	+	+	+	+	
Crangon septemspinosa	+	+	+		
Insecta Larva					+
Ceratopogonidae		+	+	+	
Chaoborus sp.			+		
Chironomid Larva		+		+	
Dipteran Larva				+	
Dipteran Pupa				+	
Coleoptera Adult					+
Hymenoptera	+				
Unknown			+		

Table 2. *The mean and ranges of diversity, number of species and density at each of the sites sampled.*

Site	Diversity (H')	Total Species	Species Per Station ($0.25m^2$)	Density/m^2
Kittery	2.66(2.02 – 3.14)	36	18.4(15 – 22)	1,050(624 – 1,632)
Falmouth	2.46(1.43 – 3.78)	37	18.8(14 – 21)	4,946(648 – 10,380)
Boothbay Harbor	2.44(1.66 – 3.09)	39	18.9(13 – 26)	5,552(404 – 19,920)
East Friendship	2.26(1.82 – 3.11)	43	22(16 – 30)	22,322(2,404 – 52,392)
Addison	1.89(1.47 – 2.35)	19	9.1(6 – 11)	2,069(1,448 – 3,232)

Table 3. *Percentage of total individuals at each site represented by the most abundant, five most abundant and ten most abundant species.*

	Kittery	Falmouth	Boothbay Harbor	East Friendship	Addison
Most Abundant Species	37.6	59.0	49.2	29.6	56.2
Five Most Abundant Species	77.2	89.3	87.8	93.1	92.9
Ten Most Abundant Species	90.9	95.7	95.5	98.3	99.6

4 was constructed in the fashion of Sanders (1960). Species were ranked in order of abundance at each station. The top ranked species was given a score of 5 points, the second ranked species 4 points . . . and the fifth ranked species received one point. By summing these values for all the stations a bioindex is produced which accounts for a species' numerical importance at each station and avoids the ranking being skewed by species which occur very abundantly

over a limited geographic range, such as *Gemma gemma* at East Friendship. In addition to bioindex, Table 4 includes each ranked species' station frequency, site frequency, the number of times it was ranked first, second, *etc.* and the number of stations at which it was ranked as one of the five most abundant species. For example the species with the third highest bioindex, *Macoma balthica*, occurred at 38 of the 39 stations and at all five sites. It was among the five most abundant species at 23 stations having been the second most abundant species at seven stations, third at three stations, fourth at eight stations and fifth at five stations. Although *M. balthica* occurred at more stations than either the oligochaetes or *Hydrobia truncata*, it is ranked below them in terms of bioindex because the latter occurred in higher abundance at a sufficient number of stations. For instance, the oligochaetes or *H. truncata* were the most abundant species at 18 and 11 stations, respectively.

Examination of Table 4 shows that 26 species achieved bioindex dominance at least at one station. Eighteen of these species were encountered at four or more sites indicating that many of the numerically important species were also widely distributed. Nine of the eleven species with the highest total bioindex ranking were bioindex dominants at three or more sites, or occurred at nearly every station, *e.g. Scoloplos* sp. These species are indicated by asterisks in Table 4. Each of these species was encountered at well over half of the total stations and, with the exceptions of *Hydrobia truncata* and *Corophium volutator* which did not occur at the southernmost site, they occurred throughout the geographical range surveyed. In addition, they represent the nine species most often ranked among the five most abundant species at individual stations (Table 4). These nine species contained 77.9% of the individuals encountered in this survey. If *Gemma gemma*, which occurred at very high densities at just one site, is removed from consideration the nine species represent 93.8% of the mud flat fauna. Based on this analysis, we may conclude that the fauna of the mud flats of the northern Gulf of Maine can be generally characterized by this small suite of species which was found regularly and

Table 4. *Faunal frequency evaluation of the 39 mud flat stations from five sites. Please see text for explanation of asterisks.*

Species	Number of stations at which taxon was ranked 1	2	3	4	5	Station Frequency	Frequency as one of five most common species	Site Frequency	Bioindex	Sites of bioindex dominance
*Oligochaeta	18	4	2	3	2	34	29	5	119.5	4
**Hydrobia truncata*	11	7	2			25	20	4	89	3
**Macoma balthica*		7	3	8	5	38	23	5	57	4
**Strebilospio benedicti*	1	5	3	5	4	32	18	5	47.5	4
**Nereis virens*	5	3		2	2	29	12	5	42.5	4
**Corophium volutator*		3	5	2		23	10	4	30.5	3
Gemma gemma	2	3	1	2		10	8	3	29	2
**Scoloplos sp.*			6	1	5	34	12	5	24.5	2
*Nematoda			6	3	1	28	10	5	24	3
Heteromastus filiformis		4		2		24	6	5	20	1
**Mya arenaria*			2	3	4	38	9	5	15.5	3
Polydora sp.	1	1	1	1	2	26	6	5	15.5	2
Nereis diversicolor			2	3	1	6	6	2	13	2
Lumbrineris brevipes	1		2			6	3	1	11	1
Notomastus latericeus				2	4	8	6	1	7.5	1
Mytilus edulis			1	1	1	20	3	5	6	2
Littorina littorea		1		1		23	2	4	6	1
Polydora ligni				2	1	15	3	3	5	1
Leucon nasicoides			1		2	10	3	2	4.5	1
Balanus balanoides		1				10	1	4	4	1
Tharyx acutus				1	2	16	3	4	3.5	1
Nephtys caeca			1			17	1	5	3	1
Gammarus mucronatus			1			6	1	4	3	1
Eteone longa				1	1	24	2	4	2.5	2
Pygospio elegans				1		11	1	3	2	1
Orchestia platensis					1	4	1	2	1	1

abundantly over the geographical range examined. In addition, although found in low abundance, the polychaetes *Heteromastus filiformis*, *Polydora* sp., and *Eteone longa* and the molluscs *Mytilus edulis* and *Littorina littorea*, were relatively constant members of the mud flat assemblage.

Two features are significant about the dendrogram resulting from the quantitative cluster analysis of sites using species abundances as attributs (Figure 2a). First, all the mud flat sites are grouped at a relatively low level of fusion. This is especially true for the Kittery, Falmouth, Boothbay Harbor and East Friendship sites. As noted above, the Addison site differed from the others in several basic biological parameters and these differences appear to be reflected in the dendrogram. The second significant feature of this dendrogram is its branching pattern. After the initial fusion of the Boothbay Harbor and East Friendship sites, subsequent fusions involve the attachment of single sites to the pre-existing group in a serial fashion, i.e. no disjunct groupings are formed as is usually the case with distinctly heterogeneous data sets. For example, sand beach faunal data from the same geographical range, collected and processed in a identical manner and subjected to the same cluster analysis strategy produces the dendrogram seen in Figure 2b (modified from Larsen and Doggett, 1990). From the levels of fusion, we see that four of the mud flat sites are more similar to one another than any two sand beach sites are to each other and at the level at which all the mud flats are fused into one group, the sand beach sites are represented in four groups. Furthermore, in contrast to the mud flat dendrogram, the branching pattern of the completed sand beach dendrogram separates the sand beach

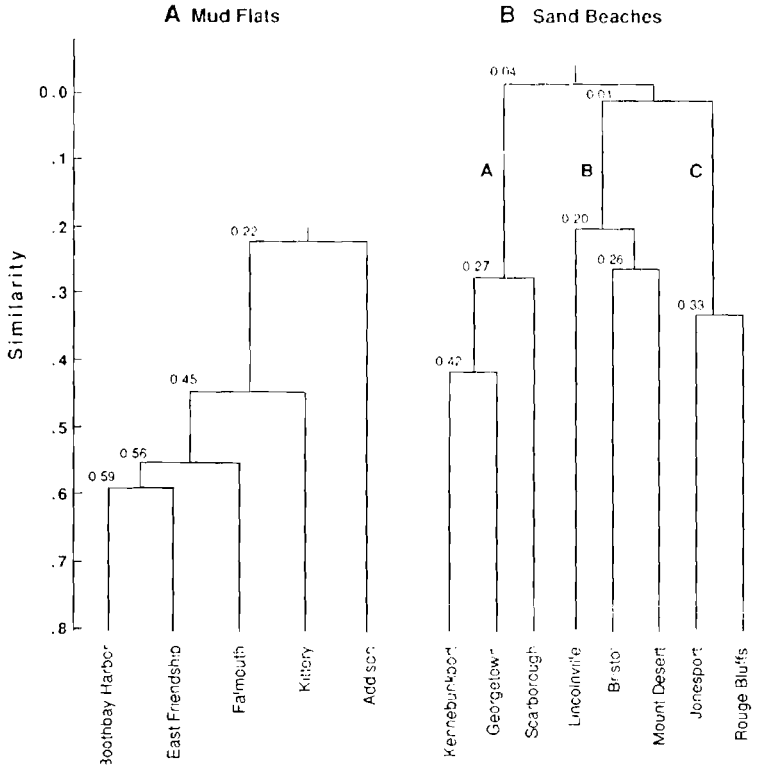

Figure 2. (a) Dendrogram resulting from the quantitative cluster analysis of mud flat sites using species abundances as attributes. (b) Dendrogram resulting from the quantitative cluster analysis of sand beach sites using species abundances as attributes (modified from Larsen and Doggett, 1990).

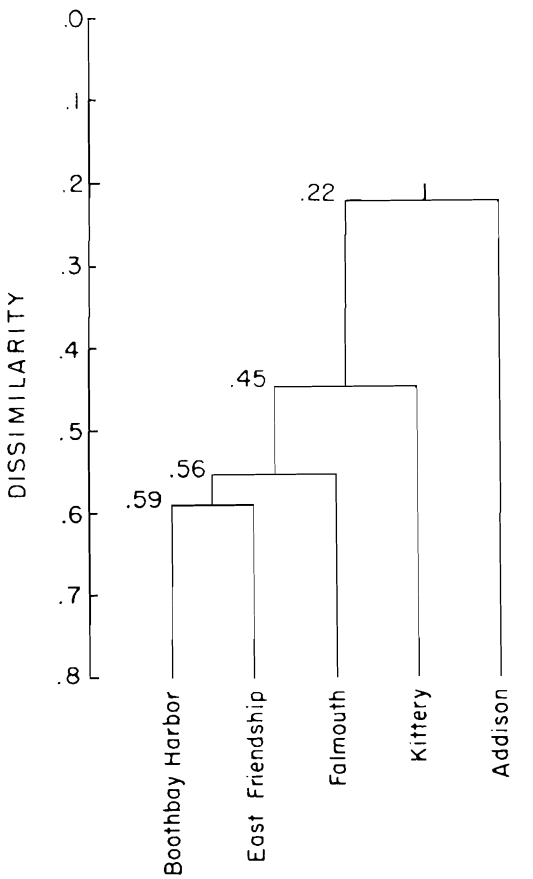

Figure 2. Continued

sites into three geographically distinct groups with a low degree of simlarity to one another; we are currently addressing the issues raised by the differing distribution patterns in various habitats. Thus, the low level of fusions and the pattern of branching in the quantitative cluster analysis corroborates the previously noted similarities in the community structure statistics (Table 2) and patterns of species dominance and distribution (Tables 1, 3, and 4).

The results of the above three analyses lead to a common conclusion: the mud flats of the central and northern Gulf of Maine are numerically dominated by a limited number of widely distributed species. The most abundant and characteristic taxa are oligochaetes, the molluscs *Hydrobia truncata* and *Macoma balthica*, the polychaetes *Streblospio benedicti* and *Nereis virens* and the amphipod *Corophium volutator*. All of these species are deposit-feeders as might be expected in a sheltered, fine-grained environment. With the exception of *S. benedicti*, these taxa are characteristic of similar environments in northern Europe (GREEN, 1968; RASMUSSEN, 1973). They are also widely distributed in the northwest Atlantic. The exception is *C. volutator* which has its American distribution center in the Bay of Fundy and the northern Gulf of Maine. The species was not found south of Falmouth, Maine (Casco Bay).

Because the previous studies conducted on the mud flats of the Gulf of Maine region were designed for purposes other than describing the natural macroinvertebrate communities, we cannot use them to make direct comparison with our results. Certain inferences can be drawn, however, which support and extend our results. For instance, *Corophium volutator, Neries virens* and *Hydrobia minuta* (= truncata) were the most common prey items of juvenile semipalmated sandpipers on a flat near the mouth of the St. John River, New Brunswick (GRATTO *et al.*, 1984). Similarly, *C. volutator* was the overwhelmingly preferred prey in the diet of four of the five shorebird species investigated by HICKLIN and SMITH (1979); in Minas Basin, Nova Scotia, 300 km northeast of our most northern site. *Hydrobia totteni* (= *truncata*) and *Macoma balthica* were also common prey. Also in Minas Basin, WILSON (1988) notes that *C. volutator, Heteromastus filifor mis* and *Streblospio benedicti* are among the six most abundant species. TUNNICLIFFE and RISK (1977) investigated the feeding of *Macoma balthica* in upper Minas Basin and describe the intertidal assemblage as "dominated by the tellinid bivalve *Macoma balthica* and the amphipod *Corophium volutator*, with scattered occurrences of *Mya arenaria, Neanthes virens, Arenicola marina,* and *Hydrobia ulvae*" (*Neanthes* = *Nereis* and *H. ulvae* = *H. truncata*).

COMMITO (1982) presents data on an undisturbed mud flat community in eastern Maine and his methods allow for more objective comparison with our results. His data are from a cove in Jonesboro, Maine, approximately 15 km east of our Addison site. *Corophium volutator* was the numerically most dominant species accounting for 63% of the individuals and the five most abundant species accounted for 89.9%

of the individuals. This degree of dominance agrees well with our results in Table 3. All nine characteristic taxa, as indicated by asterisks in Table 4, occurred at Jonesboro. Eight occurred in the samples taken to describe the natural community, where they accounted for 87.5% of the total macrofauna, and three were ranked among the five most abundant species. The only notable difference between our results and those of Commito involve the polychaete *Exogone hebes* which did not occur commonly in our samples but was the fourth most abundant species at Jonesboro. This difference can be explained in part by Commito's use of a finer sieve (0.5 mm vs. 1.0 mm) which favors the retention of small species such as *E. hebes*.

In summary, the mud flats of the Gulf of Maine are populated by a community dominated by a few widely distributed, deposit-feeding species which comprise the great majority of the individuals at any given site. The dominant component species remain largely the same along the 300 km west-east gradient sampled and perhaps to the head of the Bay of Fundy. This faunal similarity observed in the mud flat environment was exhibited in neither the sand flat environment, which proved to be faunistically very heterogeneous (LARSEN *et al.*, 1983c), nor the sand beach environment, which manifested distinct community partitioning along the coast (LARSEN and DOGGETT, 1990). There is an obvious need for additional analyses of intertidal data sets from this region with the joint goals of more completely describing the disparate faunal distribution patterns seen in different habitats and revealing the causative ecological factors.

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☐ RÉSUMÉ ☐

Les estrans vaseux constituent l'habitat dominant du golfe du Maine et sont d'une grande importance économique et écologique pour cette région. On décrit la faune des macroinvertébrés (>1mm) présente sur estrans vaseux représentatifs de 300km de côte situées dans les parties centrale et septentrionale du golfe du Maine. Les taxons les plus variés sont rencontrées chez les Annelides, mais les Annélides et les Mollusques dominent en nombre. Le nombre d'espèces rencontrées varient de 19 à 43. Leur densité varie de 624 à 52000 individus au m^2. Les analyses nuériques montrent que ces étendues de vase sont dominées en nombre par des espèces alimentant le dépôt, dont al distribution est peu étalée. Cela contraste avec les résultats antérieurs recueillis sur les estrans sableux et les plages: la composition faunistique y est hétérogène et présente une partition distincte des communautés dans le même espace géographique. Les taxons les plus caractéristiques des estrans vaseux comprennent des oligochètes, les mollusques *Hydrobia truncata* et *Macona balthica*, les polychètes *Streblospia benedicti*, ces espèces caractérisent aussi les environnements du NW de l'Europe et sont largement distribuées dans l'Atlantique du NW, sauf *C. volutator* dont la distribution est très limitée dans l'hémisphère Nord.—*Catherine Bousquet-Bressolier, Géomorphologie EPHE, Montrouge, France.*

☐ ZUSAMMENFASSUNG ☐

Schlickflächen sind ein vorherrschender Lebensraum im Golf von Maine und von ökonimischer und ökologischer Bedeutung in dieser Region. Diese Mitteilung beschreibt Macroinvertibraten (Größe 1,0 mm) von 5 representativen Schlickflächen der 300 km langen Küstenlinie im zentralen und nördlicken Golf von Maine. Arthropoden und Anneliden waren die häufigsten angetroffenen Arten, aber Anneliden und Mollusken lieferten die größte Anzahl. Die Zahl der Spezies in jedem Testgebiet variiert von 19 bis 43. Die Dichte schwankt von 624 bis über 52.000 Individuen pro m^2 mit einem Gesamtmittelwert von 7345. Numerische Analysen zeigten, daß die Schlickflächen des Golfs von Maine vor allem bestimmt werden von wenigen sedimentfressenden und weitverbreiteten Arten. Das steht im Widerspruch zu früheren Untersuchungen von Sandwatten und Sandstränden, die eine faunistische Verschiedenartigkeit und Trennung in verschiedene Lebensgemeinschaften im gleichen georgraphischen Gebiet ergeben haben. Die charakteristischsten Familien der Schlammflächen umfassen Oligochaesten, die Molusken, Hydrobia tr und Macoma balthica, die Polychaeten Streblospio benedicti und Nereis virens und die Amphipoden Corophium volutator. Mit Ausnahme von S. Benedicti sind diese Arten charakteristisch für ähnliche Ökotope in Nordwest-Europa und mit Ausnahme von C. volutator, welche in der westlichen Hemisphäre nur sehr beschränkt verbreitet ist, sing die auch im nordwestlichen Atlantik sehr weit vertreitet.—*Dieter Kelletat, Essen, FRG.*

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□ RESUMEN □

Los lodos intermareales son el hábitat más dominante en el Golfo Le Maine y son de gran importancia económica y ecológica para la región. Este artículo describe la fauna invertebrada (> 1.0 mm) de cinco áreas de lodos representativos a lo largo de 300 km de costa en las regiones central y norte del Golfo Le Maine. Artrópodos y anélidos muestran la mayor diversidad taxonómica encontrada mientras anélidos y moluscos son los dominantes numéricamente. El número de especies en cada zona varía entre 19 y 43. La densidad oscila desde 624 hasta por encima de 52.000 individuos por metro cuadrado, resultando un valor medio de 7345 por m^2. El análisis numérico muestra que los lodos intermareales del Golfo de Maine están dominados numéricamente por pocas pero muy distribuídas especies detríticas. Esto contrasta con los resultados previos de la investigación sobre arenales intermareales y playas, que manifiestan una heterogeneidad faunística y una bien marcada separación de comunidades, respectivamente, sobre la misma zona geográfica. La taxonomía más característica en los lodos intermareales incluye oligocetes, los moluscos Hydrobia truncata y Macoma balthica, los policetes Streblospio benedicti y Nereis virens y el anfípodo Corophium volutator. A excepción del S. benedicti, estas especies son características en similaries ambientes del Noroeste europeo y, a excepción del C. volutator, que tiene muy restringida distribución en el Hemisferio Oeste, están, también, profusamente distribuídos en el Noroeste atlántico.—*Department of Water Sciences, University of Cantabria, Santander, Spain.*