ANALYSIS OF ZOOPLANKTON FROM THE MAFLA OCS AREA

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INTRODUCTION

The zooplankton community is an important component of the water column ecosystem. In addition to containing permanently planktonic forms which play a. major role in the primary food chain, the zooplankton is composed of the larvae of commercially important finfish and shellfish. Many of the holo- and meroplanktonic components are sensitive to environmental perturbations resulting from gas and oil exploration.

This report summarizes the MAFLA zooplankton monitoring study accomplished during the 1975-1976 contract year.

MATERIALS AND METHODS

Forty-six zooplankton samples were received and processed by this laboratory.

Samples were split initially into halves using a Folsom plankton splitter. One-half was archived, the other half was used for counting purposes. The counting aliquot was split until a randomly selected sub-sample of approximately 200 animals was obtained. The sample was then placed in a channeled counting tray and identified/enumerated using a binocular microscope. A list of the organisms identified is on file with DMSAG.

Dry weight biomass was determined by washing the counting half of the sample in distilled water , placing it in pre-weighed aluminum weighing boats, and drying at 60°C to constant weight.

Data output furnished 'by DMSAG included numbers of each category/m^3, dry weight biomass (mg/m^3), and Shannon-Weaver diversity indices.

RESULTS AND DISCUSSION

Total zooplankton numbers/m^3 and dry weight biomass (mg/m^3) for each sampling period are shown in Figures 1-3.

Summer, 1975

Overall, both organism density and biomass were highest in Transect II (Figure 1), although Station 1308 of Transect III showed the greatest density and biomass of any single station. The high population estimates at Station 1308 are due primarily to an abundance of the ostracod, *Conchoecia* sp., other calanoids, *Centropages furcatus* (calanoid copepod), *Eucalanus elongatus* (calanoid copepod), *Oncaea* sp., and cladocerans (probably *Evadne* sp.) which made up the bulk of the sample (Table 1). High density values recorded for Stations 1204 and 1205 were due to an abundance of cladocerans (>50% of the entire sample). The biomass estimates for Station 1204, however, were the lowest for the entire transect. In general, a pattern of decreasing density was exhibited as one moves from the inshore to the offshore stations. This is expected as inshore areas are generally considered to be more productive in terms of supporting a larger standing crop of zooplankton. Biomass estimates were not directly correlated with population densities (i.e. high density–high biomass and vice versa), however, the same general inshore-offshore trend was indicated. Reasons for this non-correlation (in some cases) of density and biomass are not clear; perhaps one explanation would be the capture of more numerous smaller organisms, although numerically dominant in the sample, would not necessarily weigh more than larger, less numerous organisms collected from another area.

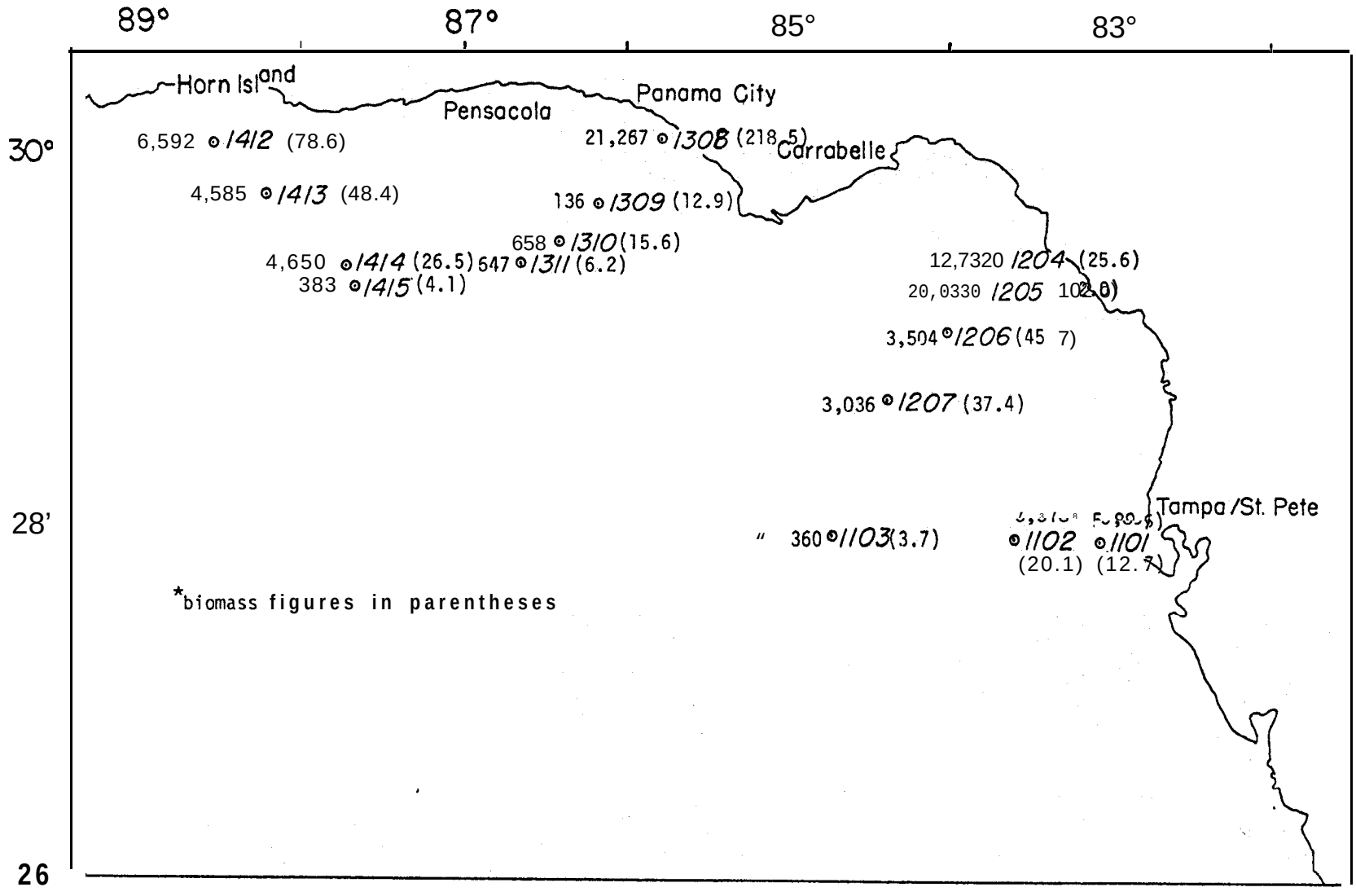

Figure 1. Total zooplankton (number/m^3) and dry weight biomass* (mg/m^3) for summer, 1975,

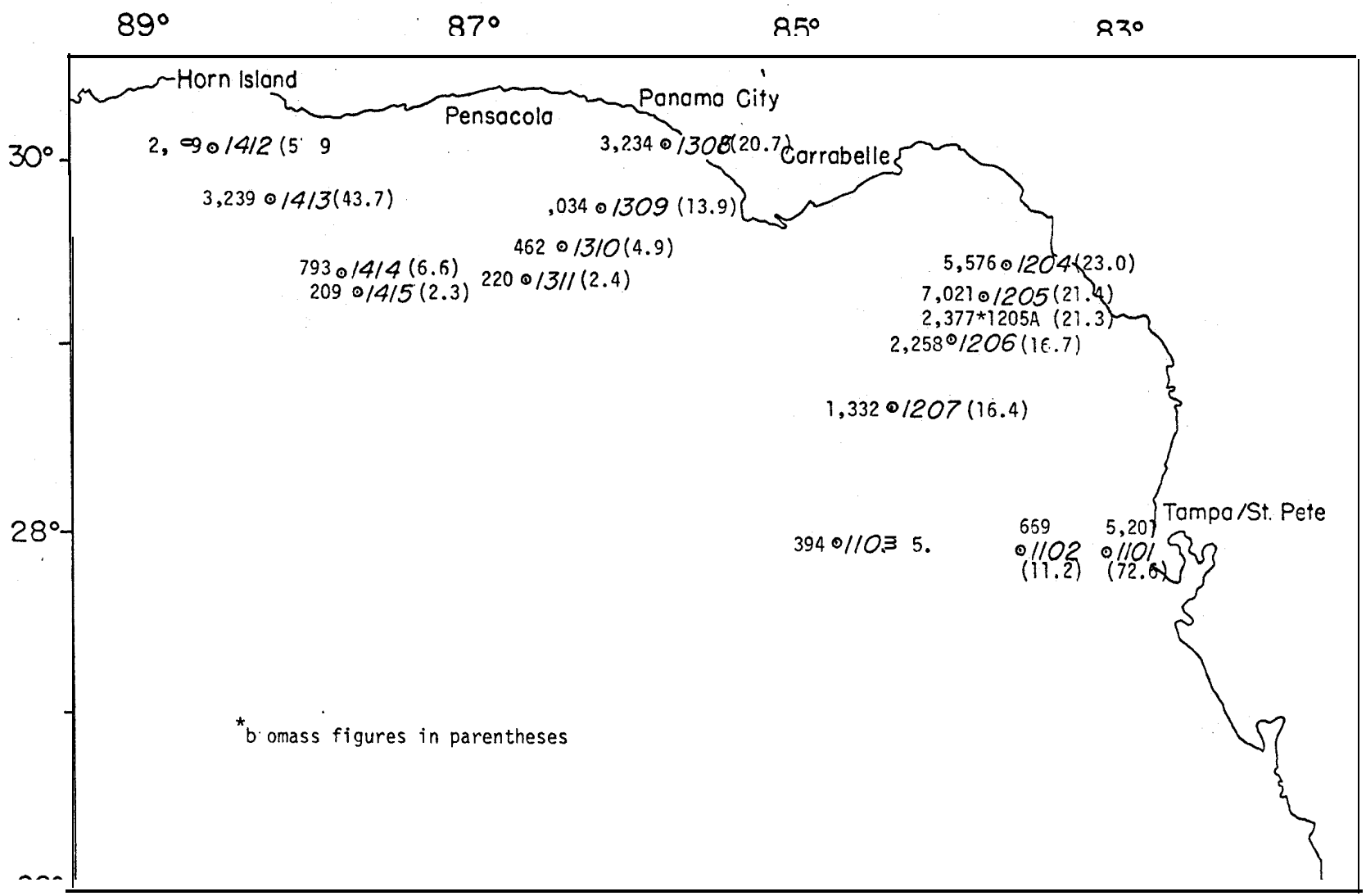

Figure 2. Total zooplankton (number/m³) and dry weight biomass* mg/m³) for fall, 1975.

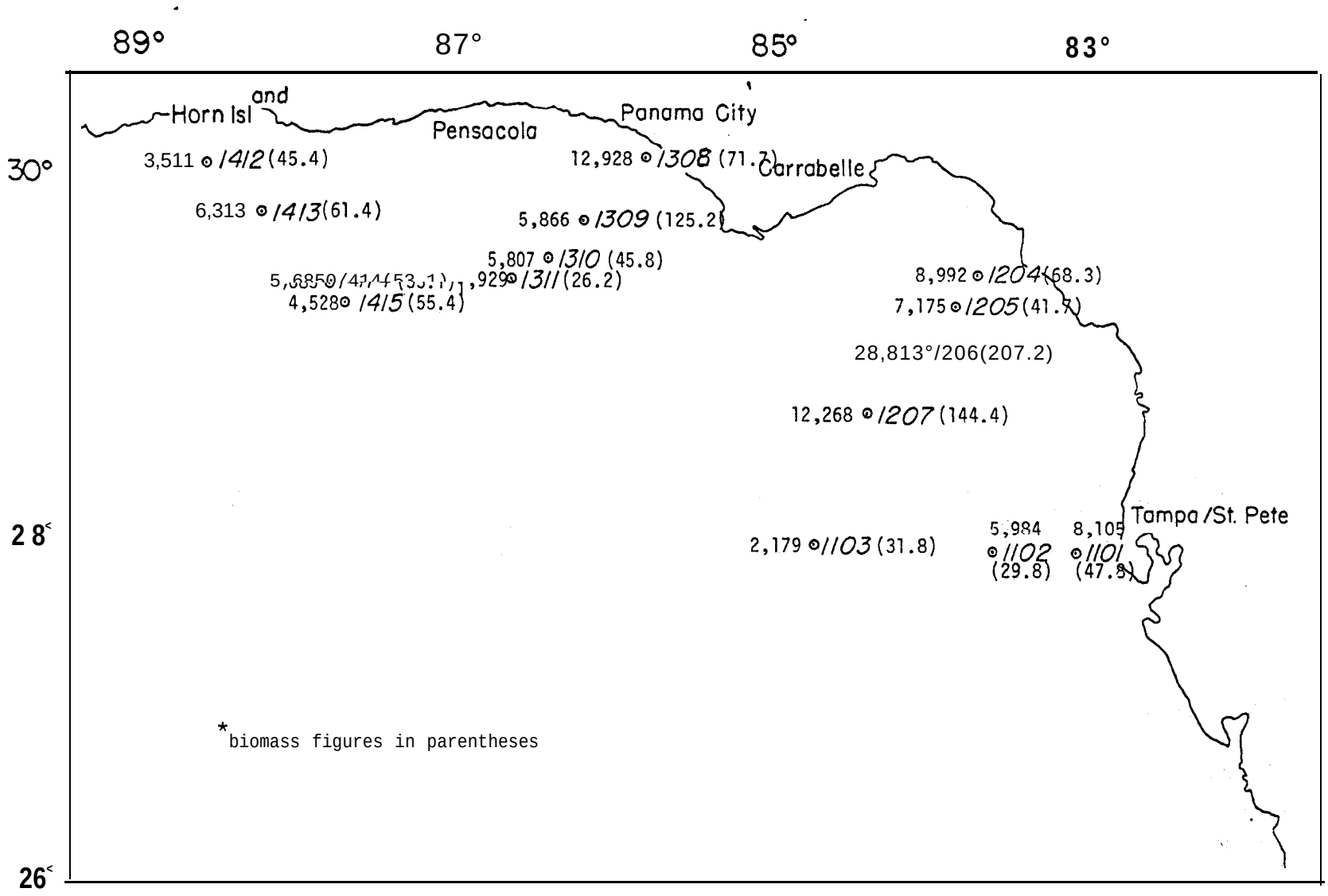

Figure 3. Total zooplankton (number/m^3) and dry weight biomass* (mg/m^3) for winter, 1976

TABLE 1. DOMINANT ZOOPLANKTON GROUPS

Station	Summer, 1975	Fall, 1975	Winter, 1976
1101	other calanoids, Doliolida	cladocerans, Oikopleura	Paracalanus sp.
1102	cladocerans, Doliolida	cladocerans	Conchoecia sp., Corycaeus sp.
1103	other calanoids, Oithona sp.	other calanoids, Pyrocystis	Paracalanus sp., Oithona sp.
1204	cladocerans	cladocerans, Paracalanus sp.	Paracalanus sp., Corycaeus sp.
1205	cladocerans	cladocerans	Paracalanus sp.
1205A	--	cladocerans, Temora turbinata	--
1206	other calanoids, cladocerans	Oncaea sp., Oikopleura	Paracalanus sp.
1207	other calanoids, chaetognaths, gastropod veligers	Conchoecia sp., Paracalanus sp., other calanoids	Paracalanus sp.
1308	Conchoecia sp., other calanoids, Centropages furcatus, Eucalanus elongatus, Oncaea sp., cladocerans	Paracalanus sp., cladocerans	Paracalanus sp., Oikopleura
1309	chaetognaths, other calanoids, Oithona sp., Eucalanus elongatus	Paracalanus sp., Oncaea sp.	Paracalanus sp., Conchoecia sp.
1310	other calanoids	Paracalanus sp., Oncaea sp.	Paracalanus sp.
1311	other calanoids	Paracalanus sp., other calanoids	Paracalanus sp., Oikopleura
1412	cladocerans, other calanoids, Undinula vulgaris (males)	Centropages furcatus, Acartia sp.	fish eggs, foraminiferans, Paracalanus sp., Eucalanus elongatus

TABLE 1. DOMINANT ZOOPLANKTON GROUPS (CONT'D)

Station	Summer, 1975	Fall, 1975	Minter, 1976
1413	anomurans, other calanoids	Oncaea sp., Doliolida	Paracalanus sp.
1414	other calanoids, Rhincalanus coronatus, Undinula vulgaris (males)	Paracalanus sp., Oncaea sp.	Paracalanus sp., Conchoecia sp.
1415	other calanoids	cyclopoid copepodites, Paracalanus sp.	Paracalanus sp.

With the major exception of Stations 1308, 1204, and 1205, calanoid copepods were the dominant zooplankton group in most areas.

Fall, 1975

The lowest density and biomass estimates were recorded during the fall sampling period. Samples collected during this period also showed the most marked decline in comparison of inshore to offshore stations. Stations 1415 and 1311 showed the lowest density and biomass estimates (209 and 220/m³ and 2.3 and 2.4 mg/m^3, respectively) while Station 1101 showed the highest biomass estimate (72.6 mg/m^3) and Station 1205 the highest specimen abundance (7,021/m^3)(Figure 2). The post-hurricane station (1205A) showed a drop in species abundance as compared to Station 1205 but retained cirtually the same biomass.

-Again, the dominant zooplankton group during this period was primarily the calanoid copepods, although cladocerans were abundant in the inshore stations of Transects I and II. Acartia sp. was found at Station 1412, suggesting the presence of water of more estuarine origin. The appearance of Temora turbinata as a dominant group at the post-hurricane station (1205A) is a result of a decrease in the cladoceran population rather than an increase in this calanoid. This would suggest that perhaps the mixing of the water column by the hurricane somehow adversely affected the cladoceran population.

Winter, 1976

Samples collected during the winter sampling period compared most favorably, in terms of organism density and biomass, with the summer samples. This period also showed the highest population density and biomass of all the seasons. This was due, primarily, to the great abundance of

Paracalanus sp. in almost all of the samples (Table 1), which would suggest this calanoid copepod is an active winter breeder. The highest density and biomass was recorded at Station 1206, with Paracalanus sp. being the dominant group. Although the same general inshore-offshore trend was present as in other seasons, it was much less pronounced. This is especially true in Transect IV, where it remains relatively constant throughout all the stations; in Transect II the trend is almost reversed, the offshore stations showing greater diversity and biomass than the inshore stations (Figure 3).

As mentioned previously, the dominant zooplankton group is Paracalanus Sp. Exceptions to this include Station 1102 where the ostracod Conchoecia sp. and the cyclopoid copepod Oncaea sp. are dominant and Station 1412, where fish eggs and foraminiferans are dominant groups as well as Paracalanus. The abundance of fish eggs at this particular station could be the result of the net passing through a recent spawn or a group of eggs which were clumped together.

Shannon–Weaver Diversity Index

The Shannon-Weaver diversity index showed the expected general trend of increasing diversity as one proceeds from inshore to offshore (Table 2). Samples collected in the fall generally showed a higher diversity than the summer samples. This would also be expected due to lower numbers of animals collected in the fall and, as a result, the reduced presence of any one group which dominated the sample. Although complete diversity data from the winter samples are not available at this time, preliminary calculations indicate the same inshore-offshore trend , with a somewhat decreased diversity overall due to the dominance of the Paracalanus sp. group.

TABLE 2. SHANNON-WEAVER SPECIES DIVERSITY

Station	Summer, 1975	Fall, 1975	Winter, 1976
1101	2.165	2.085	1.948
1102	2.553	2.526	2.431
1103	2.708	2.830	2.629
1204	0.716	1.613	2.280
1205	1.063	1.692	2.084
1205A		2.414	
1206	2.175	2.551	2.077
1207	2.685	2.363	1.975
1308	2.179	2.399	2.3?6
1309	2.384	2.487	2.530
1310	2.431	2.825	2.490
1311	2.563	2.754	2.965
1412	2.316	2.185	2.868
1413	2.441	2.515	2.779
1414	2.809	2.570	2.154
1415	2.730	2.769	2.062

SUMMARY

1) The winter sampling period showed the highest overall zooplankton density and biomass of all the seasons. This was due primarily to the high abundance of the Paracalanus sp. group. Winter was followed by summer and fall, with the fall season showing the lowest values.

2) An inshore-offshore pattern of decreasing abundance and biomass as one proceeds offshore was shown for all seasons. The fall period showed the most marked decline, followed by summer and winter. This pattern was less discernible in the winter samples.

3) Shannon-Weaver diversity indices indicated a trend of increasing diversity from inshore to offshore.

4) Diversity appears to be slightly higher in the fall than in the summer. Preliminary calculations of winter data would indicate a similar inshore-offshore trend, with lower overall diversity than the other two seasons.