Surface Zooplankton at Carrie Bow Cay, Belize

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ABSTRACT

Zooplankton at Carrie Bow Cay, Belize, was sampled by conventional plankton net tows in the open ocean immediately seaward of the reef and in the lagoon in order to obtain plankton both before and after it had passed over the reef. Tows were taken at the surface and in depths of 3 m at each location, at approximately 0400 h, 0800 h, 1600 h, and 2000 h. The composition of the samples indicates primarily oceanic plankton at both locations, and elements of a presumed resident reef fauna at the shallower lagoon station. Results demonstrate a net import of zooplankton to the reef and substantiate observations by other workers that plankton abundance increases at night.

Introduction

Investigations of zooplankton diversity, dynamics, and biomass provide essential information about breeding patterns (Moore and Sander, 1976, 1977), behavioral strategies (Emery, 1968; Alldredge and King, 1977), emergence patterns (Glynn, 1973; Porter, 1974; Porter et al., 1977), predation (Johannes et al., 1970; Goreau et al., 1971; Stevenson, 1972; Davis and Birdsong, 1973; Gerber and Marshall, 1974; Hobson, 1974; Porter, 1974), and the energetic impact of planktonic organisms on coral reef communities (Yonge, 1930; Sargent and Austin, 1954; Odum and Odum, 1955; Quasim and Sankaranarayanan, 1970; Tranter and George, 1972; Glynn, 1973; Johannes, 1974; Johannes and Gerber, 1974; review by Lewis, 1977). The present report is concerned with zooplankton from the surface water adjacent to the coral reef at Carrie Bow Cay, Belize, and its possible import to that coral reef community.

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Materials and Methods

Plankton was sampled by towing a 29 cm diameter plankton net (100 μm mesh net, 250 μm mesh basket) at a fixed distance behind a small boat during April and May 1976. In order to sample plankton both before and after it had passed over the barrier reef, the net was towed parallel to the reef at two locations. Site 1 ("ocean") is immediately seaward of the fore-reef slope. Water depth in this area is greater than 200 m. Site 2 ("lagoon") is approximately 0.5 km shoreward of the reef at Carrie Bow Cay. Water depth at site 2 ranges from 5 to 8 m. The predominant wind direction at the time was ENE, so that trade winds were blowing from the open ocean in the direction of the lagoon.

Horizontal tows at each site were taken consecutively at two depths, 0–0.5 and 2.5–3.0 m. Approximate times of tows were 0400 h (approximately 1 hour before sunrise), 0800 h, 1600 h and 2000 h (approximately 1.5 hours after sunset) during the same 24-hour period, whenever weather conditions permitted.

The net was equipped with a calibrated flow meter and all tows were timed (5–10 min) with a stopwatch, so that volume of water filtered could be calculated. Samples were fixed in 10% for-

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malin in sea water in the boat immediately after each tow. In addition, live samples were returned to Carrie Bow Cay for observation.

The settled volume of the plankton in entire samples was determined by straining samples through 100 μm mesh plankton netting and rinsing them into a 25 ml graduated cylinder. Volume was recorded until constant readings were obtained (24 to 36 h). Large organisms such as Scyphozoa and Leptocephalus larvae (Pisces) as well as plant debris (for instance, *Thalassia testudinum* Banks ex König and *Turbinaria* sp.) were removed prior to volume determination. Any embryos suspended in mucus, however, could not be removed without interfering with other organisms in the sample.

All samples were then subdivided using an eight-chambered plankton splitter. The volume of each sample was adjusted to 100 ml by the addition of 10% formalin in filtered sea water prior to splitting. One-eighth of each sample was removed and stained with 0.1% rose bengal to facilitate identification and enumeration of organisms. The highly abundant copepods and non-cirripede nauplii (mostly copepod) were counted by adjusting the one-eighth subsample to a volume of 20 ml and further subsampling it by removing 1 or 2 ml with a Hensen Stemple pipette. All counts were made under a Wild M 5 stereomicroscope having a plankton counting wheel mounted on the base. The field of view at × 25 magnification spanned the width of the plankton wheel groove and permitted continuous counting while the wheel was rotated.

The remaining seven-eighths subsample was strained through 100 μm mesh netting, dried at 60°C for 24 h and weighed to the nearest 1 mg after cooling in a desiccator. Samples were then ashed at 510°C and ash-free dry weights calculated.

The Wilcoxon signed-ranks test (Sokal and Rohlf, 1969) was applied to means generated exclusively from paired groups of samples.

Results

Copepods and nauplii comprise much of the plankton in both lagoon (n = 40) and ocean (n = 32) samples (Table 13). In the lagoon, copepods account for 53.0% and nauplii (mostly copepod) account for 31.5% of the total number of individuals (combined value = 84.5%). Similarly, in ocean samples the mean percentage of copepods was 52.7 and of nauplii 29.7 (combined value = 82.4%). At the taxonomic level at which the organisms were counted, more than 82% of the taxa were common to both lagoon and ocean samples. These values are comparable to those reported by Moore and Sander (1976) for the inshore zooplankton overlying two other Caribbean coral reef areas, where copepods comprised 76.0% (Jamaica) and 84.4% (Barbados) of the plankton.

Significant quantitative differences appear when samples are compared on the basis of the

TABLE 13.—Relative abundance (percentage of individuals) of major plankton categories (≥ 0.5%) on either side of the barrier reef at Carrie Bow Cay (number of samples in parentheses)

Plankton	*Lagoon (40)*	*Ocean (32)*
Copepoda	53.0	52.7
Nauplii	31.5	29.7
Gastropoda larvae	3.0	2.0
Fish ova	2.4	1.2
Larvacea	2.2	8.3
Polychaeta larvae	1.9	3.9
Shrimp* larvae	1.1	0.3
Brachyura larvae	1.1	0.3
Pteropoda	0.9	1.0
Cirripeda larvae	0.8	0.7
Chaetognatha	0.7	0.5

* Euphausiacea, Penaeidea, Caridea.

TABLE 14.—Results of Wilcoxon signed-ranks test applied to abundance of organisms in different sample groups compared on basis of mean number of individuals/m^3 (data from Table 15; + = significant at $P \leq 0.05$; 0 = no significant difference)

Sample groups compared	*Total plankton*	*Copepods and nauplii*	*Others*
Ocean : Lagoon	+	+	+
Night : Day	+	+	0
0–0.5m : 2.5–3.0 m depth	0	0	+

TABLE 15.—Summary statistics for counts and biomass values (means ± standard error) for plankton of all lagoon and ocean tows (composite data from the two habitats are identified by hour, depth, and number of samples)

Statistic	*Lagoon*							
	0800 h		*1600 h*		*2000 h*		*0400 h*	
	0–0.5 m (*n*=5)	*2.5–3.0 m* (*n*=6)	*0–0.5 m* (*n*=5)	*2.5–3.0 m* (*n*=5)	*0–0.5 m* (*n*=5)	*2.5–3.0 m* (*n*=4)	*0–0.5 m* (*n*-5)	*2.5–3.0 m* (*n*=5)
Volume filtered (m^3)	28.5	24.4	30.1	28.7	27.3	26.3	26.9	25.3
Total no. of individuals/m^3	485.4±122.7	384.8±65.3	284.4±53.0	394.0±48.1	442.2±181.8	428.3±178.8	445.2±167.5	289.8±67.1
No. of copepods and nauplii/m^3	442.6±120.1	340.8±61.2	238.8±51.3	336.0±46.0	362.6±175.2	355.5±166.3	384.6±145.8	248.6±59.1
No. of individuals other than copepods and nauplii/m^3	42.8±6.4	44.0±9.4	45.6±5.9	58.0±9.0	79.6±15.9	72.8±19.1	60.6±22.2	41.2±10.9
Settled volume (ml/m^3)	0.25±0.05	0.21±0.04	0.17±0.03	0.19±0.05	0.27±0.05	0.20±0.05	0.17±0.02	0.18±0.04
Ash-free dry weight (mg/m^3)	2.04±0.51	1.58±0.35	1.10±0.24	1.87±0.88	3.43±1.32	1.67±0.34	1.68±0.23	1.39±0.21

Statistic	*Ocean*							
	0800 h		*1600 h*		*2000 h*		*0400 h*	
	0–0.5 m (*n*=6)	*2.5–3.0 m* (*n*=6)	*0–0.5 m* (*n*=4)	*2.5–3.0 m* (*n*=4)	*0–0.5 m* (*n*=3)	*2.5–3.0 m* (*n*=3)	*0–0.5 m* (*n*=3)	*2.5–3.0 m* (*n*=3)
Volume filtered (m^3)	27.7	27.5	27.9	30.0	30.2	30.9	26.6	26.9
Total no. of individuals/m^3	455.8±92.2	508.8±185.4	946.8±158.4	606.0±110.4	2061.5±1250.5	2098.0±1340.2	471.7±229.8	669.7±415.3
No. of copepods and nauplii/m^3	279.8±66.8	390.3±152.2	703.8±171.3	480.3±111.0	1902.0±1217.0	2033.3±1366.1	356.0±152.0	561.0±352.9
No. of individuals other than copepods and nauplii/m^3	126.0±54.5	118.5±35.7	243.0±123.8	125.8±2.4	159.5±33.5	64.7±32.0	115.7±78.3	108.7±62.7
Settled volume (ml/m^3)	0.38±0.14	0.35±0.10	0.30±0.06	0.28±0.07	0.31±0.16	0.34±0.04	0.21±0.13	0.21±0.13
Ash-free dry weight (mg/m^3)	1.65±0.39	1.71±0.65	2.65±0.52	1.11±0.32	5.28±1.92	3.15±1.00	1.66±0.95	1.55±1.02

TABLE 16.—Plankton categories, and number of individuals (means ± standard error) per m^3 water for all lagoon and ocean tows (composite data from the two habitats are identified by hour, depth, and number of samples; + = present but <0.5 individuals per m^3 water)

Plankton category	*Lagoon*							
	0800 h		*1600 h*		*2000 h*		*0400 h*	
	0–0.5 m (n=5)	*2.5–3.0 m (n=6)*	*0–0.5 m (n=5)*	*2.5–3.0 m (n=5)*	*0–0.5 m (n=5)*	*2.5–3.0 m (n=4)*	*0–0.5 m (n=5)*	*2.5–3.0 m (n=5)*
Cnidaria larvae	1.3±0.78	+	0.8±0.58	1.0±0.44	+	+	0.5±0.29	+
Medusae	0.9±0.42	+			0.9±0.79	0.6±0.21	0.7±0.64	1.7±0.79
Siphonophora	3.0±0.94	0.7±0.16	+	1.2±0.27	0.9±0.30	+	1.0±0.28	0.9±0.38
Ctenophora	+			+				
Platyhelminthes larvae	1.1±0.45	1.4±0.76	0.3±0.17	0.6±0.14	+	+	+	0.6±0.28
Polychaeta larvae	4.4±1.43	3.9±0.91	5.0±1.44	5.6±0.71	9.2±2.54	16.8±5.78	5.3±0.81	3.5±1.03
Polychaeta adults	0.5±0.36	+			+	0.5±0.30	+	+
Sipunculida larvae	+	+		+	+	+	+	+
Bryozoa larvae		+	+		+		+	
Gastropoda larvae	9.6±1.26	8.1±1.94	6.6±1.35	8.0±1.89	13.5±2.71	9.8±3.37	8.1±2.10	6.8±0.87
Pelecypoda larvae	0.7±0.32	0.8±0.27		+	1.5±0.67	0.7±0.55	0.5±0.30	0.7±0.30
Pteropoda	2.9±1.74	3.3±0.84	2.7±1.27	6.9±2.39	3.3±1.33	8.5±6.05	1.6±0.80	0.7±0.33
Cladocera	1.0±0.54	+	0.7±0.60	2.3±1.44	+	+	+	+
Ostracoda	+	0.5±0.34	+		+	+	0.7±0.48	0.9±0.74
Copepoda	320.5±103.05	231.2±41.72	126.4±23.24	193.1±27.17	219.4±119.82	210.6±112.5	250.9±95.57	154.6±38.96
Nauplii	122.5±38.78	109.5±26.11	113.6±30.31	142.9±34.47	142.5±57.04	144.9±54.88	133.4±50.47	94.0±35.22
Cirripeda larvae	0.6±0.36	1.1±0.54	8.2±5.93	0.6±0.23	2.0±0.66	2.1±0.77	1.0±0.72	+
Stomatopoda larvae	+	+	+		+	0.8±0.61	+	+
Mysidacea	+			+	+	+	1.2±0.66	0.9±0.58
Cumacea	+	+	+	+	5.8±4.14	+	2.9±2.22	0.7±0.17
Amphipoda	+	+		+	1.0±0.78	+	0.5±0.29	+
Shrimp* larvae	0.9±0.29	2.4±0.83	+	+	12.5±3.84	6.6±2.60	2.6±0.66	3.4±1.23
Anomura larvae						+	+	+
Brachyura larvae	0.9±0.67	9.7±5.67	+	0.5±0.20	2.1±0.89	2.8±0.83	4.1±1.54	7.2±4.31
Echinodermata larvae	0.8±0.69	+	+	+	+			
Hemichordata larvae			+					
Urochordata larvae		+			+		+	+
Salpa				+	+		+	
Doliolida	+		+		+	+		+
Larvacea	5.2±0.76	5.1±1.10	6.3±2.05	18.4±10.24	4.7±1.05	11.33±7.30	24.8±21.00	8.2±6.41
Chaetognatha	4.9±1.21	2.6±0.83	1.1±0.63	1.8±0.41	1.8±1.27	2.0±1.41	2.4±0.72	2.8±1.09
Fish ova	4.6±1.66	2.9±0.98	12.4±3.20	9.1±3.32	17.4±4.62	7.1±4.08	1.9±0.53	1.7±0.36
Fish larvae	+		+	1.4±1.21	0.5±0.30	0.6±0.21	+	+

TABLE 16.—Continued

Plankton category	Ocean							
	0800 h		1600 h		2000 h		0400 h	
	–0.5 m (n=6)	2.5–3.0 m (n=6)	0–0.5 m (n=4)	2.5–3.0 m (n=4)	0–0.5 m (n=3)	2.5–3.0 m (n=3)	0–0.5 m (n=3)	2.5–3.0 m (n=3)
Cnidaria larvae	5.6±3.44	3.7±2.00	1.6±0.55	1.7±0.24	0.7±0.05	0.6±0.32	2.5±1.31	1.3±0.21
Medusae	+	+	0.8±0.21	+	+	2.8±1.77	+	
Siphonophora	2.2±0.90	2.4±0.55	2.6±0.77	1.7±0.37	1.0±0.05	1.9±0.92	1.4±0.79	1.2±0.67
Ctenophora				+				+
Platyhelminthes larvae	1.8±0.80	3.8±2.29	1.3±0.65	0.7±0.55	+	0.8±0.35	1.3±0.84	1.7±1.50
Polychaeta larvae	27.2±16.58	25.9±23.83	112.7±91.82	17.9±7.05	18.7±11.00	17.8±2.08	17.4±12.46	9.7±4.87
Polychaeta adults		+	+	+	+	0.6±0.43	+	+
Sipunculida larvae	0.9±0.46	2.0±1.97	1.1±0.58	+		+		
Bryozoa larvae	1.0±0.87		+	+	0.7±0.70	+		+
Gastropoda larvae	9.1±2.24	9.7±2.55	14.9±1.69	16.6±8.08	23.3±9.70	14.2±3.58	3.8±1.58	5.9±2.45
Pelecypoda larvae	0.5±0.20	2.1±0.97	1.9±0.50	2.0±0.66	+	1.2±0.05	1.0±0.51	1.0±0.51
Pteropoda	8.3±7.16	2.2±1.39	9.2±2.69	12.0±7.40	5.5±1.15	2.8±0.60	19.8±9.65	3.6±2.08
Cladocera	5.9±5.11	2.8±1.32	1.4±0.55	1.0±0.58		0.5±0.38	1.6±1.31	1.6±1.55
Ostracoda	0.5±0.37	+	+		+	0.8±0.47	1.7±1.69	8.2±7.53
Copepoda	202.8±48.22	273.5±125.92	392.3±166.15	247.2±92.87	1307.0±798.55	1181.3±798.32	236.8±114.09	344.2±212.15
Nauplii	118.6±18.36	116.90±47.66	311.8±98.03	233.2±45.45	572.3±395.40	829.4±547.78	119.2±40.93	216.7±140.76
Cirripeda larvae	0.8±0.54	+	6.9±5.76	15.5±15.50	3.0±3.00	+	5.5±2.12	1.9±0.62
Stomatopoda larvae		0.5±0.48	+		0.7±0.05	+		
Mysidacea					0.6±0.55			
Cumacea			+		0.8±0.35			
Amphipoda	+		+	+	+	+	+	0.8±0.77
Shrimp* larvae	0.5±0.22	+	0.6±0.28	+	23.3±6.45	1.4±0.72	2.5±1.28	1.3±1.11
Anomura larvae		+				+	0.6±0.56	0.8±0.20
Brachyura larvae	+	1.8±0.92	0.6±0.38	1.0±0.77	22.2±14.80	1.2±0.64	1.9±0.99	1.4±0.21
Echinodermata larvae	+	0.8±0.33	+	0.6±0.28	0.7±0.05	0.6±0.36	1.3±0.38	1.3±0.18
Hemichordata larvae	+			0.5±0.48		1.1±1.13	+	+
Urochordata larvae	+		1.2±1.20	+			+	0.8±0.62
Salpa		0.6±0.26	0.6±0.48	+	+	+	+	0.6±0.64
Doliolida	0.5±0.43	+	+	+	+	+	0.5±0.38	0.7±0.60
Larvacea	56.2±24.46	56.2±25.96	48.4±38.14	47.1±22.34	17.7±0.40	28.4±13.14	39.2±29.18	56.7±36.69
Chaetognatha	1.9±0.70	2.5±1.04	4.8±1.10	3.3±1.68	9.7±6.85	7.7±2.45	2.5±0.75	3.6±1.22
Fish ova	4.8±1.79	2.0±1.01	32.6±31.91	2.3±1.62	28.0±13.20	3.2±1.06	9.8±7.80	3.1±1.56
Fish larvae	+	+	+		1.1±0.35		0.5±0.25	0.7±0.21

* Euphausiacea, Penaeidea, Caridea.

mean abundance of organisms in different habitats and light periods (Table 14). In order to eliminate the influence of the dominant copepods and nauplii, these groups were tested as a separate category. Abundance of organisms in ocean samples is greater than in lagoon samples with respect to all three counts. Night tows (0400 h and 2000 h) yield a larger combined number of individuals than daytime samples (0800 h and 1600 h), as would be expected from the bimodal pattern of plankton emergence (near dawn and dusk) indicated by Glynn (1973). This difference does not hold, however, for organisms other than copepods and nauplii which show no significant quantitative difference between night and day. On the other hand, surface tows (0–0.5 m) differ significantly from 2.5–3.0 m tows only with respect to plankton other than copepods and nauplii.

These differences are not entirely reflected by settled volume or ash-free dry weights (Table 15). When mean values for settled volume generated by paired groups of samples are compared by the Wilcoxon signed-ranks test, significantly more plankton volume/m^3 is found in ocean samples than lagoon samples and, contrary to individual numbers, in day tows than in night tows ($P \leq 0.05$). The latter result is probably due to the presence of significantly more siphonophores in day samples (see below). Depth of tow did not have bearing on volume of plankton. Ash-free dry weight, which is a more reliable estimate of biomass than settled volume, does not differ significantly when locations or times of day are compared (Table 17) using means generated by paired groups of samples (Table 15). Significantly more plankton biomass (mg/m^3), however, is found at 0–0.5 m than in 2.5–3.0 m, regardless of location or time of day. The lack of agreement between these measurements of numbers of individuals and biomass probably reflects differences in the composition of the samples (Tables 13, 16) as well as patchiness or unevenness in zooplankton distribution. Patchiness is indicated by the large standard errors of means calculated for all counts and biomass measurements in the present study (Tables 15, 16). It should be noted, however, that mean ash-free dry weight (mg/m^3) of ocean samples is greater than that of lagoon samples, that of night samples exceeds that of day samples, and that of 0–0.5 m samples is greater than that of 2.5–3.0 m samples (Table 17).

The dominant organisms other than copepods and nauplii represented at both locations indicate a primarily oceanic plankton: larval polychaetes, gastropods, cirripedes, and shrimps (Euphausiacea, Penaeidea, Caridea) as well as pteropods, larvaceans, chaetognaths, and fish ova (Tables 13, 16). Of these groups, polychaete larvae, gastropod larvae, larvaceans, and chaetognaths are significantly more numerous in ocean than in lagoon samples ($P \leq 0.05$). Similarly, larval cnidarians, platyhelminthes, bryozoans, pelecypods, and echinoderms, as well as siphonophores, ostracods, copepods, nauplii, salps, and doliolids are more numerous in ocean samples. Also, although the blue-green alga *Oscillatoria* (= *Trichodesmium*) sp. was not counted, it was observed to be a major component of the ocean but not the lagoon plankton. These results may indicate a net import of organisms to the reef because oceanic plankton is removed from the water column by the reef community. Similar findings are reported by Tranter and George (1972) at Kavaratti and Kalpeni atolls in the Laccadives, by Glynn (1973) at Puerto Rico, and by Johannes and Gerber (1974) at Eniwetok Atoll. In contrast, Motoda (1940) and Johnson (1949, 1954) found zooplankton to be less abundant in ocean waters than in lagoon waters. However, as pointed out by several au-

TABLE 17.—Carrie Bow Cay plankton biomass, expressed as ash-free dry weights (mg/m^3 ± standard error) for the six major sample groups, with results of Wilcoxon signed-ranks test for paired groups (+ = significant at $P \leq 0.05$; 0 = no significant difference)

Sample group	*mg/m^3*	*Wilcoxon test*
Ocean	2.35±0.41	0
Lagoon	1.85±0.30	
Night	2.48±0.41	0
Day	1.71±0.25	
0–0.5 m	2.44±0.41	+
2.5–3.0 m	1.75±0.28	

thors (Alldredge and King, 1977; Porter and Porter, 1977; Porter et al., 1978; Rützler et al., 1980), plankton samples from the surface waters associated with coral reefs do not necessarily reflect the amount of plankton actually available to reef organisms. In the present study, certain groups of organisms (mysids, cumaceans, brachyuran larvae) are present in significantly ($P \leq 0.05$) greater numbers per m^3 in the lagoon. Also, the percentage of the plankton represented by these groups, together with adult polychaetes and shrimp larvae, is greater in the lagoon than outside the reef (based on data in Table 13, with the addition of lagoon versus ocean sample percentages for adult polychaetes, 0.2:0.04; mysids, 0.08:0.004; and cumaceans, 0.4:0.005). Similarly, the foraminiferan *Rosalina* (= *Tretomphalus*) sp. was recorded as abundant in lagoon but not in ocean samples. These results may indicate a significant difference in the composition of the plankton between the two localities. Hence, this difference may also reflect the presence of a resident reef fauna in the lagoon, represented by organisms that are at times considered demersal, such as adult polychaetes, mysids, cumaceans, shrimp larvae, and brachyuran larvae (Tranter and George, 1972; Sale et al., 1976; Alldredge and King, 1977; Porter and Porter, 1977). Such a resident reef fauna would be sampled only partially by the methods used in the present study and more likely would appear in samples from the lagoon, where water depth is only 5–8 m and small patch reefs are common. Similarly, differences in composition but not necessarily in biomass of lagoon and offshore plankton were found by Johnson (1954), Odum and Odum (1955), Bakus (1964), Tranter and George (1972), and Sale et al. (1976). This difference would indicate removal of oceanic plankton by reef organisms and replacement by a resident lagoon plankton (Emery, 1968).

Tows taken at 0–0.5 m and 2.5–3.0 m appear to have similar composition. Mysids, cumaceans, and fish ova were more abundant ($P \leq 0.05$) at 0–0.5 m whereas pelecypod and anomuran larvae were more common in 2.5–3.0 m tows.

Comparing day and night tows, significantly more cnidarian larvae, siphonophores, platyhelminth larvae, sipunculid larvae and cladocerans appear in daytime (0800 h and 1600 h) tows. Crustacean groups (ostracods, mysids, cumaceans, amphipods, shrimp larvae, and anomuran larvae) as well as doliolids, however, are more abundant at night (0400 h and 2000 h). Results of this study agree, in general, with Emery (1968), Johannes et al. (1970), Glynn (1973), Porter (1974), and Renon (1977), who have noted both quantitative and qualitative differences between day and night samples of zooplankton over a variety of coral reefs. More specifically, Alldredge and King (1977) also report more ostracods, mysids, cumaceans, amphipods, shrimps, and decapod larvae in night tows than in daylight tows at Lizard Island on the Great Barrier Reef.

Conclusions

Copepods and nauplii (mostly copepod) combined account for 84.5% and 82.4% of the zooplankton in lagoon and ocean samples, respectively, from Carrie Bow Cay. Other major groups of organisms represented at both locations (larval polychaetes, gastropods, cirripedes, and shrimp, as well as pteropods, larvaceans, chaetognaths, and fish ova) indicate a primarily oceanic plankton.

The relative abundance of mysids, cumaceans, adult polychaetes, and brachyuran and shrimp larvae in the lagoon may indicate partial sampling of a resident reef fauna in this habitat. Samples from the open ocean contain a significantly greater number of organisms (copepods and nauplii, as well as all others) per m^3 water than those from the lagoon, and therefore suggest a net import of zooplankton to the reef. Plankton biomass, expressed by ash-free dry weight was greater in ocean, night, and 0–0.5 m samples than in lagoon, day, and 2.5–3.0 m tows.

Resident reef fauna will have to be sampled directly before final conclusions can be drawn about the impact of zooplankton on the energy budget of the coral reef community.

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