ABSTRACT

Monthly sampling was conducted at a station 1.6 km off Jamaica's north shore from June 1989 to July 1991, inclusive. The primary objective was the description of the annual structure and production of the copepod community in the area. This was accompanied by an estimation of the quantities of food (phytoplankton biomass, particulate organic carbon and particulate protein) and the nature of physical parameters (temperature, salinity and light attenuation) which may affect this production. The abundance and biomass of copepod predators (the chaetognaths) as well as an estimate of chaetognath production, was determined in order to evaluate the effect of predators on the copepod community.

The food and physical parameters were sampled in replicate from six depths throughout the water column: 1, 30, 60, 100, 150 and 200 m, using 6 L niskin bottles. The copepods and chaetognaths were collected in replicate vertical hauls from 60 and 200 m with 64, 200 and 600 μm mesh plankton nets.

Secondary production estimates were based on moulting rates obtained from individually reared nauplii and copepodites as well as egg production of adult females. Calculations were done using a modification of

the instantaneous growth rate method.

There was no seasonal pattern to the monthly variation in physical parameters and food. However, there was significant vertical spatial variation. Mean temperatures from the six depths sampled were (in descending order) 28.1, 27.9, 27.6, 26.8, 25.3 and 23.0 °C. Similarly, mean salinities at these depths in the same order were 35.4, 35.5, 35.6, 35.7, 35.9 and 36.1 ‰. The depths at which 1% of the surface illumination was recorded were quite variable throughout the sampling period, ranging from 24 to 102 m; 0.01% of surface illumination was recorded at a maximum depth of 204.9 m.

Particulate organic carbon values ranged from 40 to 400 mg C m^{-3}, while particulate protein values ranged from 20 to 250 mg m^{-3}. Although vertical variation was significant, there was no general trend to this variability. Size fractionated phytoplankton biomass from all depths across months showed a dominance of the picoplankton fraction. Total biomass values varied significantly with depth and there appeared to be a sub-surface maximum at 100 m. Mean total chlorophyll *a* values for the six depths sampled (in descending order) were: 0.12, 0.09, 0.15, 0.18, 0.08, 0.02 mg m^{-3}.

69 copepod species were identified including 44 calanoids, 18 cyclopoids, 6 harpacticoids and 1

monstrilloid. The dominant species in the population when both biomass and numbers m^{-3} were considered were: *Undinula vulgaris, Oithona plumifera, Oncaea* spp., *Paracalanus* spp. and *Euchaeta marina*.

Copepod abundance and biomass also indicated an absence of homogeneity in the vertical plane. Larger numbers and biomass values were consistently recorded in the 60 m hauls while the 200 m hauls had lower abundances and biomass per m^3. Overall numbers ranged from 16 to 4120 m^{-3} and biomass ranged from 0.12 to 2.89 mg m^{-3}. Biomass was calculated using length weight regressions determined for 12 copepod genera (R^2 = 0.79 to 0.97). Energy density of mixed copepods ranged from 18.46 to 25.28 J mg^{-1} (average of 20.84).

Chaetognath abundances and biomass were generally low and *Sagitta enflata* dominated the population, followed by *Pterosagitta draco*. Chaetognath biomass was also determined from length weight regressions (R^2 = 0.73 and 0.68 for *S. enflata* and *P. draco*, respectively). Energy density for chaetognaths ranged from 17.7 to 22.94 J mg^{-1} (mean of 18.72).

Generation time (length of the life cycle) for the dominant copepods varied from 34.7 days (*Undinula vulgaris*) to 18.1 days for *Paracalanus* spp. Generally daily specific growth rates decreased in the later copepodite stages and adults. The mean daily specific

growth rate, averaging all stages, ranged from 0.21 to 0.68 d^{-1}. The daily specific growth rate for assorted nauplii was 0.59 d^{-1} and *Euchaeta marina* egg production progressed at a daily rate of 0.11 d^{-1}.

Mean annual copepod production calculated for populations in the upper 60 m was 2724.4 J m^{-3} yr^{-1} (163.5 KJ m^{-2} yr^{-1}). Production values for populations in the entire 200 m depth was 1357.8 J m^{-3} yr^{-1} (271.6 KJ m^{-2} yr^{-1}).

Chaetognath production values, which were calculated using growth rates from the literature, ranged from 448.2 J m^{-3} yr^{-1} (26.9 KJ m^{-2} yr^{-1}) to 3531.1 J m^{-3} yr^{-1} (70.6 KJ m^{-2} yr^{-1}) in 60 and 200 m respectively. These values, which were lower than estimates from a food satiated area on the south coast of Jamaica, indicated food limited growth.