SPECIES DIVERSITY AND COMMUNITY STRUCTURE OF THE MACROZOOPLANKTON OF KANEOHE BAY, OAHU, HAWAII

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consumers (Sagitta and Pleurobrachia) dominate. In short, a very simple community lives in the southern sector, one governed by a few species, which seems to have existed as such for many years. Due to high rates of water exchange in other sectors of the bay, no significant changes would be expected there.

SUMMARY

1. An environmental gradient extends the length of Kaneohe Bay from the southern to northern sectors. This gradient is generally shown by differences in mean standing stocks of macrozooplankton. Standing stocks decreased from 1104/m^3 in the southern sector, to 601/m^3 in the transition zone, 379/m^3 in the middle sector, and 82/m^3 in the northern sector.

2. The reaction of the 44 resident macrozooplankton taxa to this environmental gradient was variable. Twenty-one animals were most abundant in the southern sector, decreasing in numbers as distance from this area increased (Table IV). Seven animals were most abundant in the transition zone, decreasing in numbers both north and south of this zone. Four animals were most abundant in the middle sector, decreasing in numbers through the transition zone and into the southern sector. Two animals were most abundant in the northern sector, decreasing regularly towards the south (Table V). Nine animals were nearly equally abundant in the southern sector, transition zone, and middle sector (Table VI).

3. Nine animals were ubiquitous: Sagitta enflata, Lucifer chacei Oikopleura longicauda, Lucifer protozoeas and schizopods, crab zoeas,

decapod mysis, Veliger-A. All other animals were taken infrequently, or were restricted to one or two areas of the bay. Three animals were taken only in the wouthern sector: bipinnaria larvae, polychaete trochophores, and the copepod Cyclops. The mysis stage of Stenopus (cleaner shrimp) were never taken in the southern sector (Tables VII and VIII).

4. In terms of relative abundance, certain animals exhibited different gradients as compared to their overall abundance. Sagitta enflata was relatively more abundant in the transition zone (40.2%) than in the southern sector (33.5% of the total individuals) or middle sector (28.6%). Oikopleura longicauda had equal relative abundances in the southern sector and transition zone (16.0%) but increased in importance to 25.5% in the middle sector. Pleurobrachia reacted similarly, constituting 2.7% and 2.9& in the southern sector and transition zone, and increasing to 15.2% in the Middle sector (Table IX).

5. From analysis of rank-ordered abundance, seven taxa were common to the first ten ranks of the southern sector, transition zone, and middle sector assemblages: Sagitta enflata, Oikopleura longicauda, Pleurobrachia, Lucifer protozoea, decapod mysis, crab zoea, and Veliger-A. Barnacle nauplii and Medusa-E ranked high in the southern sector and transition zone. These nine animals seem to be the most important animals to the Kaneohe Bay zooplankton communities.

6. Six species made up more than 90% of the mean standing stock in the southern, middle, and northern sectors. Nine species made up more than 90% of the transition zone mean standing stock (Table XIV).

7. Relative abundances of macrocopepods increased from 0.5% of the average southern sector standing stock to 37.2% of the northern

sector standing stock. Holoplanktonic carnivores increased from 30.8% in the southern sector to 43.5% in the transition zone and 46.9% in the middle sector. Percentages were lowest in the northern sector (18.6%). Relative abundance of holoplanktonic herbivores increased from 12.9% in the southern sector to 35.7% in the northern sector. Meroplankton decreased in importance from the southern sector northward (Table XV).

8. The rank-order of macrozooplankton community diversity was southern sector (least diverse), middle sector, transition zone, and northern sector (most diverse). Diversity in the transition zone and middle sector was lower near the Oahu shoreline than near the Sampan Channel or barrier reef.

9. From feeding observations, it was determined that the dominant carnivores in Kaneohe Bay show a distinct preference for Oikopleura, but can feed upon other animals as well (pp. 64-64).

10. From considerations of probable energy flow through the proposed food chain, and relative abundances of the major components, the southern sector was shown to be the most simply structured area of the bay. The transition zone had more complex structure than either the southern sector or middle sector.

11. It was hypothesized that predation by chaetognaths on the primary consumers may control diversity, and may be responsible for the structure of the southern sector, transition zone, and middle sector zooplankton assemblages.

12. Although pollution may theoretically effect the southeast basin's flora and fauna, no major alterations are expected in the future. The southern sector already harbors a simple community, the structure

of which is governed by only two primary consumers and two secondary consumer species. In other areas of the bay flushing rates are high enough to effectively disperse sewage effluents.