THE ROLE OF *SAGITTA ENFLATA* IN THE SOUTHERN KANEOHE BAY ECOSYSTEM

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAII IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN OCEANOGRAPHY

DECEMBER 1976

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ABSTRACT

The chaetognath Sagitta enflata dominates the standing stock of macrozooplankton, and of planktonic carnivores, in the southern basin of Kaneohe Bay. During 1973-74, sampling with vertical net hauls showed no horizontal patchiness in the population. The abundance varied temporally, mainly over periods of months; shorter-term variations were similar to those expected between replicate hauls. Between 1968-69 and 1973-74, both the stock and the dominance of Sagitta in the community increased; both may be related to enrichment of the basin with sewage.

Individual Sagitta eat an average of seven prey items per animal per day. The ration in terms of nitrogen or other weight measures varies with animal length, larger Sagitta ingesting more material each day, but smaller Sagitta ingesting a larger fraction of their own body weight daily. Sagitta's predation has little impact on the prey populations, other than Oikopleura, which is the main food of larger Sagitta.

Sagitta excretes ammonium and phosphate at rates roughly similar to other zooplankton of similar size. When feeding is prevented during excretion experiments, the specific excretion rates decrease rapidly with time, approaching those observed in laboratory-starved animals. Like other zooplankton, Sagitta has higher N/P ratios in its body tissue than its prey; its soluble excreta thus have a still lower ratio. Despite its abundance and dominance of macroplankton stock, Sagitta is only a minor contributor to nutrient regeneration in the southern basin, which is to be expected, based on its trophic position.

The population's rates of growth and mortality were considerably higher than the net change in the stock during most periods analyzed. The instantaneous rates of birth and death are strongly correlated, suggesting a feedback mechanism regulating the population.

The population incorporates carbon at about 1% of the rate of primary production in the basin. This is consistent with ecological efficiencies of 10% at each of the two steps from producers to herbivores to Sagitta's position as the dominant primary carnivore among the plankton. Most of Sagitta's production is probably consumed by predators in the southern basin. The major predator may be nehu, a fish taken for tuna bait from this and other nearby environments.

With the planned diversion of sewage from the basin, it is likely that both the stock and the dominance of Sagitta in the southern basin will decrease.