

## Estimates of Biological Parameters of Sword Prawn (*Parapenaeopsis hardwickii*) in the Adjacent Waters off Taichung Harbor

Tzong-Der Tzeng and Shean-Ya Yeh\*

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### ABSTRACT

Seasonal growth parameters, mortality rates and recruitment pattern of female sword prawn (*Parapenaeopsis hardwickii*) were estimated from a length-frequency data set with ELEFAN methods. The 6-month data set was collected from the adjacent waters off Taichung harbor between February and July 1992. Parameters of the von Bertalanffy growth equation with seasonal fluctuations obtained were:  $L_{\infty} = 39.0$  mm carapace length,  $K = 1.1$  (1/year),  $C = 0.95$  and  $WP = 0.94$  of year. The total mortality coefficient  $Z$  was 6.37 (1/year) estimated by seasonalized length-converted catch curve procedure. The average natural mortality coefficient  $M$  of 2.07 (1/year) was obtained from the empirical methods of Pauly (1980) and Srinath (1991). The fishing mortality coefficient  $F$  was 4.30 (1/year) ( $F = Z - M$ ). The exploited rate  $E$  of 0.67 ( $F/Z$ ) showed that the sword prawn population is over-exploited. The annual recruitment pattern obtained by back-projecting these length frequency samples onto an arbitrary one-year time axis showed that recruitments occur in two pulses of unequal strength. The longevity  $t_{max}$  of sword prawn is 2.74 years.

**Key words:** *Parapenaeopsis hardwickii*, Growth parameters, Mortality, Recruitment pattern.

### INTRODUCTION

Reliable estimates of growth, mortality and other population parameters of exploited populations are essential for their proper assessment and management. Three kinds of data could be used to obtain the information of these parameters. They are (1) length at age data obtained by reading of growth marks on hard parts, (2) growth increment data obtained from mark-recapture experiment, and (3) length frequency data. Length frequency analysis may be currently the only method available and reliable for estimation of growth and mortality parameters of shrimp, since hard body-parts are lost during molting and tagging is not practicable (Baelde, 1994; Etim and Sankare, 1998).

Length frequency analysis may be classified into two groups: statistical decomposition, e.g., MIX (MacDonald and Green, 1985), MULTIFAN (Fournier *et al.*, 1990), and mode progression method, e.g., ELEFAN (Pauly *et al.*, 1984). The former is more statistically intense, providing more statistical detail and the latter is more ad hoc.

Although the growth of crustaceans is discontinuous during the molting period, the von Bertalanffy growth equation (VBGE) is still believed to be a reasonable approximation for Penaeidae (Parrack, 1979; Garcia and Le Reste, 1981; Fre'chette and Parsons, 1983). However, because the growth of shrimp is strongly affected by the temperature (Pauly *et al.*, 1984), suggestion has been made to incorporate