

Blecha, James B. September 1972. The effects of temperature on biomass production in juvenile California spiny lobster, Panulirus interruptus (Randall). California State University, San Diego Master's Thesis.

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#### ABSTRACT

The basis of this study involved quantitation of the factors in the equation

$$\text{Ingestion} = \text{Respiration} + \text{Growth} + \text{Rejecta}$$

and the effect of temperature upon these factors, particularly growth, for juvenile California spiny lobster, *Panulirus interruptus*.

The total amount of food ingested and the resulting growth were measured for complete molt cycles on groups of juveniles at 16 C, 21-22 C, and 26-27 C. Total calories of food ingested per individual increased with increasing temperature, although the duration of the molt cycle decreased with increasing temperature. Relative growth (increase in weight/initial weight) decreased from 55% at 16 C to 40% at both higher temperatures.

Standard metabolic rates (SMR) were constant at 0.040 ml O<sub>2</sub>/g wet wt/hr from 11-17 C, increased between 17 C and 21 C, remained relatively constant at

about 0.095 to 27 C and increased to 0.135-0.140 at 30 C. Active metabolic rates increased from 0.070 ml  $O_2$ /g wet wt/hr at 16 C to 0.146 at 26-27 C. Periodic increases in the standard metabolic rates occurred approximately 3 days prior to and following ecdysis.

Values for rejecta (feces plus nitrogenous excretions) were obtained from the literature and by calculation. These values showed that the relative amount of rejecta increased with increasing temperature. Assimilation efficiency decreased with increasing temperature.

Mean gross growth efficiencies decreased by 21% between 21-22 C and 26-27 C, but the net growth efficiency decreased by only 7% over the same temperature range. It appears as if biomass production occurs as efficiently at each temperature once energy is assimilated.

When all factors are considered, including mortality rate, the optimal temperature for increased biomass production of *P. interruptus* in an aquaculture program should be approximately 24 C.