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A New Length-weight Relationship for Northern Shrimp (*Pandalus borealis*)
off West Greenland (NAFO Subareas 0+1)

by

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Abstract

Data on individual length and weight of northern shrimp (*Pandalus borealis*) were recorded during the West Greenland Bottom Survey for shrimp and fish in 2001 and 2002. These data could not be fitted satisfactorily with the length-weight relationship that had previously been used and hence a new one was computed. A comparison of the two relationships for converting length to weight indicates that condition of northern shrimp has decreased in the past years.

Introduction

Individual length and weight of northern shrimp (*Pandalus borealis*) were recorded over a period of several years during the West Greenland Bottom Trawl conducted annually by the Greenland Institute of Natural Resources since 1988, and the resulting length-weight relationship (Carlsson and Kannevorff, 2000) has been used e.g. for the calculation of spawning stock biomass from female numbers by length.

Stock biomass of northern shrimp off West Greenland has substantially increased during the past years and recent measurements of length and weight indicate a decrease in condition. To account for this in the estimation of male and female biomass based on numbers by length, a new relationship for the conversion of length to weight has been computed, which is presented in this paper.

Material and Methods

A detailed description of survey design, area coverage, fishing practice and routine sample analysis applied in the West Greenland Bottom Trawl Survey for shrimp and fish during the past years is given in Kannevorff and Wieland (2001, 2002). In addition to the routine sampling procedure, length and weight of 1 225 individuals of northern shrimp were measured in 2001 and 2002. The data include all sexual stages and cover the major part of the survey area (Table 1). Oblique carapax length was measured using a slide calliper and weight was recorded with a Marel M2000 Marine Laboratory Scale with a resolution of 0.01mm and 0.1 g, respectively.

Results and Discussion

Figure 1 shows length and weight of northern shrimp for all sexual stages and sampling areas pooled. The resulting length-weight relationship is:

$$W = 0.00048271 * CL^{3.0576}$$

where W is the weight in g and CL is oblique carapax length in mm. Although derived from the pooled data, this relationship is suitable to fit the observations also for the single sexual groups (Fig. 2), i.e. males and juveniles, primiparous females (majority with headroe) and multiparous females (only a few were carrying eggs). A comparison with the length-weight relationship established by Carlsson and Kannevorff (2000) for the years prior to 2000 indicates a lower condition of northern shrimp in the most recent years (Fig. 2).

Recording of individual length and weight data of northern shrimp should continue in order to allow a more detailed statistical analysis on possible differences in the length-weight relationship between the various developmental stages and survey areas as well as to study the effect of the substantial increase in biomass and density, which has been observed in particular in some parts of the surveyed area, e.g. the Disko Bay, in the past years (Kannevorff and Wieland 2002), on the condition of northern shrimp.

References

- Carlsson, D.M. and P. Kannevorff. 2000. Stratified-random trawl survey for northern shrimp (*Pandalus borealis*) in NAFO Subareas 0+1 in 2000. NAFO SCR Doc., No. 78, Ser. No. N4335, 27 p.
- Kannevorff, P. and K. Wieland. 2001. Stratified-random trawl survey for northern shrimp (*Pandalus borealis*) in NAFO Subareas 0+1 in 2001. NAFO SCR Doc., No. 175, Ser. No. N4520, 23 p.
- Kannevorff, P. and K. Wieland. 2002. Stratified-random trawl survey for northern shrimp (*Pandalus borealis*) in NAFO Subareas 0+1 in 2002. NAFO SCR Doc., No. 148, Ser. No. N4777, 25 p.

Table 1. Number of northern shrimp for which individual length and weight were recorded in 2001 and 2002.

Area	Number measured		
	Males (incl. juveniles)	Primiparous females	Multiparous females
N	0	0	0
D	0	26	68
C	73	18	16
W1	101	58	39
W2	0	0	0
W3	32	32	28
W4	42	15	10
W5	5	2	7
W6	161	95	147
W7	86	18	9
S1	20	20	20
S2	45	16	16
Sum:	565	300	360

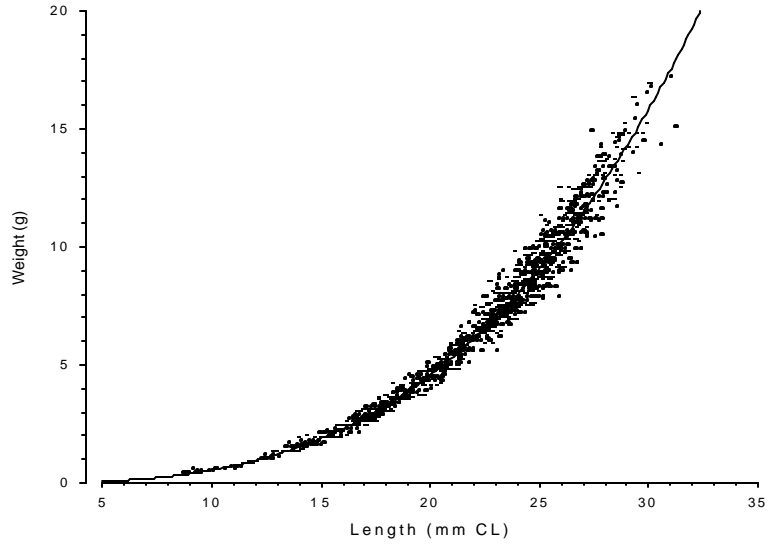


Fig. 1. Length-weight relationship of northern shrimp off West Greenland measured in 2001 and 2002.
($Y = 0.000483 * X^{3.0576}$, $r^2: 0.9716$, $n: 1225$).

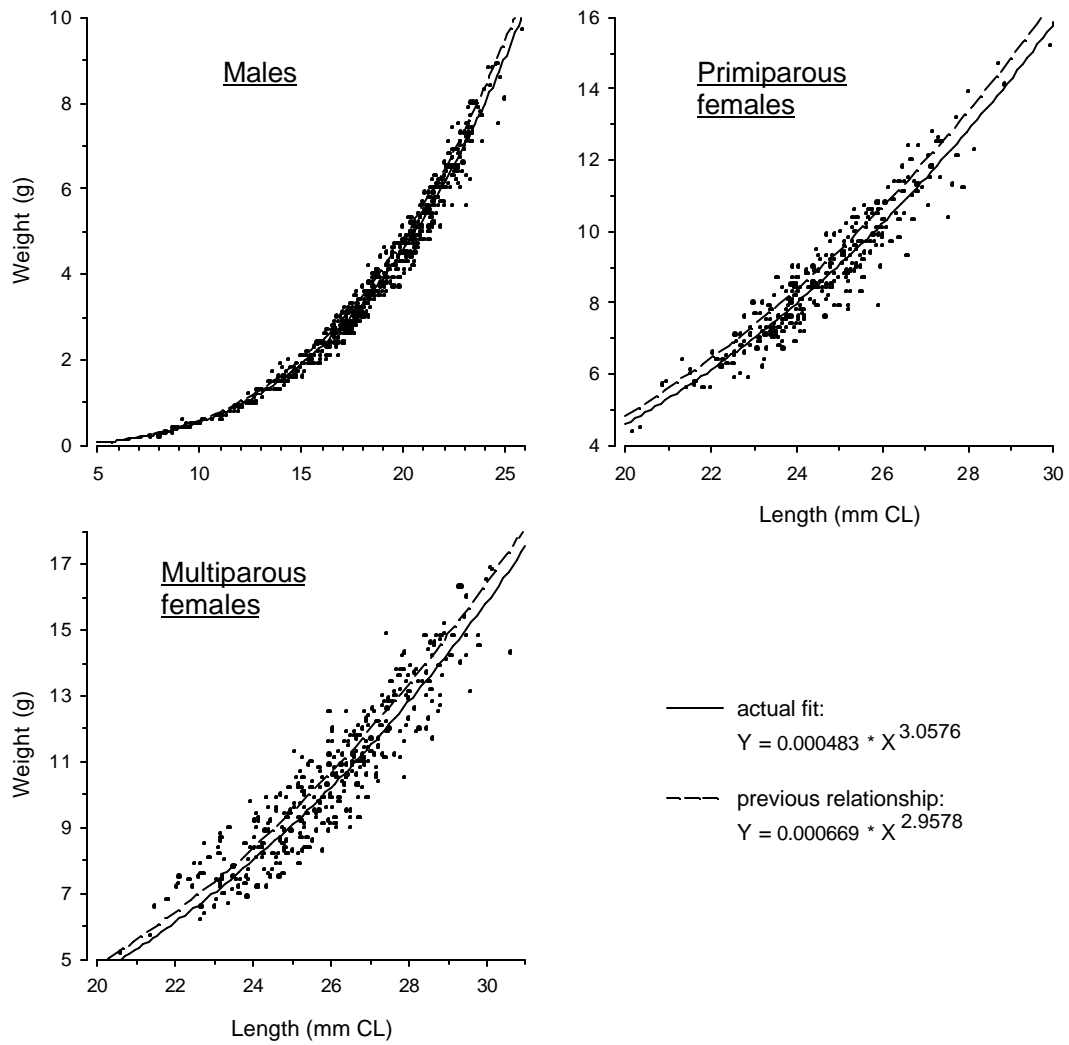


Fig. 2. Length and weight of northern shrimp in 2001 and 2002 by sexual group (males incl. juveniles, primiparous and multiparous females) with fitted nonlinear regression (solid line, see Fig. 1 for parameters). Previous length-weight relationship (dashed line) from Carlsson and Kannevorff (2000) is given for comparison.