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TITLE: Population dynamics of *Salpa thompsoni* near the Antarctic Peninsula: Growth rates and interannual variations in reproductive activity (1993?2009)

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ABSTRACT:

The salp *Salpa thompsoni* has exhibited increased abundance in high latitude portions of the Southern Ocean in recent decades and is now frequently the numerically dominant zooplankton taxon in the Antarctic Peninsula region. The abundance increase of this species in high latitude waters is believed related to ocean warming. Due to its continuous filter feeding and production of dense rapidly sinking fecal pellets *S. thompsoni* is considered to be an important link in the export of particulate carbon from the surface waters. Hence basic information on the life history of this component of the Antarctic marine ecosystem is essential for assessing its impact given continued climate warming. Here we cover various aspects of the life history of *S. thompsoni* collected in the north Antarctic Peninsula during annual austral summer surveys of the US Antarctic Marine Living Resources (AMLR) Program between 1993 and 2009. We focus on seasonal and interannual variations in the size composition and abundance of the aggregate (sexual) and solitary (asexual) stages. This information is valuable for refining components of Southern Ocean food web models that explicitly deal with size-structured and life history information on zooplankton. Intraseasonal changes in length?frequency distribution of both stages are used to estimate their growth rates. These average 0.40 mm day⁻¹ for aggregates and 0.23 mm day⁻¹ for solitaires; together these represent ?7 week and ?7.5 month generation times, respectively, and a 9 month life cycle (i.e., onset of aggregate production year 1 to aggregate production year 2). Based on the maximum lengths typically found during January?March, the life spans of the aggregate and solitary stages can reach at least ?5 and ?15 months, respectively. Length?frequency distributions each year reflect interannual differences in timing of the initiation and peak reproductive output. Interannual differences in the abundance of total salps and proportions of the overwintering solitary stage are significantly correlated with El Niño Southern Oscillation indices (SOI and Nino3.4) prevailing over the previous 2 years. Massive salp blooms result from two successive summers of elevated solitary production following a reversal from La Niña to El Niño conditions. These results indicate the role of basin-scale atmospheric?oceanic processes in establishing optimal conditions that support aggregate and solitary stage reproduction, development and growth.

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