

The implications of energetic limitation for diapausing
Calanus finmarchicus: Towards a Gulf of Maine Calanus
budget.

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Abstract

Recent work suggests that diapausing *C. finmarchicus* in the Gulf of Maine (GOM) may face severe energetic limitation over the course of the summer and fall. To better understand how the GOM *C. finmarchicus* population sustains itself on an interannual basis in the face potentially high loss rates we have constructed a six compartment, two layer box model of GOM *C. finmarchicus* population dynamics during the summer and fall. Each compartment corresponds to a standard station sampled repeatedly through the summer and fall of 2001 to January 2002. Compartments include the Slope Water (SW) just east of Georges Bank, the Northeast Channel (NEC), the Scotian Shelf (SS) north of Browns Bank, Georges Basin (GB), Jordan Basin (JB), and Wilkinson Basin (WB). The model is reinitialized at three intervals, June – August, August – November, and November – January, which correspond to the intercruise periods during the sampling season. Production is controlled by chlorophyll driven egg production, temperature controlled development rates and stage specific mortality. Additions to the deep, diapausing population occur through maturation and advection. The deep population is subject to losses from advection, predation, and energetic limitation. The model successfully tracks aggregate changes in the Gulf of Maine deep layer *C. finmarchicus* population during Intervals 1 and 3 but overestimates the population during Interval 2 due to strong production in the surface layer. Small adjustments in early life history mortality rates dramatically reduce the differences between observed and predicted populations. The effects of a number of other changes, including reduced advection and food limitation, are also examined.