



## Vertical distribution and mortality of overwintering *Calanus*

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**ABSTRACT:** Overwintering *Calanus* spp. were studied in four Norwegian fjords with different predator regimes and ranging in depth from 380 to 1300 m. Three fjords held both the planktivorous mesopelagic fish *Maurolicus muelleri* and *Benthosema glaciale* and invertebrate predators, whereas one lacked mesopelagic fish but had especially high abundance of several invertebrate predators. Co-occurrence of *C. finmarchicus*, *C. helgolandicus*, and *C. glacialis* rendered distinction between effects of environmental conditions and inherent species properties in choice of depth difficult. The highest daily per capita mortality rate for *Calanus* was estimated at 0.024-0.027 d<sup>-1</sup> (95% CI) in a fjord with high fish abundance and with the clearest water. Predation by *M. muelleri* and *B. glaciale* alone could explain the estimated winter mortality. The fjord devoid of mesopelagic fish but particularly rich in invertebrate predators gave the lowest estimated mortality rate; 0.008-0.009 d<sup>-1</sup> (95% CI). Our results indicate that mesopelagic fish pose a stronger predatory threat than invertebrates to overwintering *Calanus*. This concurs with *Calanus* selection of oceanic winter habitats below depths where planktivorous fish can forage efficiently by sight.

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