

Second-order seasonal variability in diel vertical migration timing of euphausiids in a coastal inlet

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ABSTRACT: Variability in the diel vertical migration timing of euphausiids in Saanich Inlet, British Columbia, Canada, is quantified using 2 years of echosounder data from a cabled observatory. The continuous and high-resolution nature of the observations allows examination of second-order seasonal variability in migration timing relative to civil twilight times. Early dusk ascent and late dawn descent occur during spring–fall, while late dusk ascent and early dawn descent occur during winter. Ascent timing appears to be regulated by (1) light availability at the daytime depth of the euphausiids, which is modulated by phytoplankton bloom shadowing, and (2) euphausiid size-dependent visual predation risk. Because (1) does not apply at dawn, descent timing appears to be regulated by (2). During the pre-spawning period, higher energy demand for reproduction may cause earlier dusk ascent and later dawn descent to maximize energy gain, even with larger body size. Instead of the traditional view of diel vertical migration timing, correlated solely with civil twilight, our data suggest that euphausiids also adapt their migration timing to accommodate changes in environmental cues as well as their growth.