

**Title**

Effects of body size, condition, and lipid content on the survival of juvenile lake herring during rapid cooling events

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**Abstract**

Juvenile lake herring *Coregonus artedii* were exposed to rapid cooling events during two laboratory experiments to determine the effects of body size, physiological condition, and lipid content on survival. The first experiment was conducted at the onset of winter, exposing small (50 to 85 mm) and large (85 to 120 mm) fish to a decline in water temperature from 12 to 2° C at a rate of 1° C/hr. During this experiment, both large and small individuals exposed to a rapid cooling event experienced no mortality or abnormal behaviors. Separate fish were then maintained under thermal and photoperiod regimes that mimicked those in Lake Superior from October through May. Fish in each size class were maintained at two feeding treatments: *Artemia ad libitum* and no food. At the completion of the winter period, these lake herring exhibited no mortality or abnormal behaviors despite treatment-dependent differences in condition and lipid content. Our results indicate that mortality due to rapid cooling events does not appear to contribute to the recruitment variability observed for juvenile lake herring in Lake Superior.

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