



## **Mysis relicta in a eutrophic lake: Consequences of obligatory habitat shifts**

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**ABSTRACT:** Low numbers of mysids in eutrophic lakes have usually been related to their poor tolerance to low oxygen. In eutrophic Lake Hiidenvesi, we studied the possibility that water quality indirectly affects mysids by forcing them to habitats where they are vulnerable to fish predation. *Mysis relicta* was absent from basins that did not stratify (water depth < 10 m). In the deep basin, as the summer progressed, *M. relicta* was concentrated in the deepest areas and moved upward in the water column as water temperature increased and dissolved oxygen decreased. Between mid-August and mid-September, only a thin water layer was habitable; the rest had either intolerably low oxygen concentration or too high of a temperature. *M. relicta* abundance decreased from  $2.72 \times 10^8$  individuals on 3 June to  $3.72 \times 10^6$  individuals on 19 October, with the sharpest decrease taking place in August. At the same time, the vertical distribution of smelts shifted downward and the percentage of mysids in the stomach contents of smelts increased steeply. The consumption rate by smelts was high enough to explain the collapse of the *M. relicta* population; during 18 August-2 September, smelts consumed 5.6 times the mysid production. The results suggested that unfavorable physicochemical conditions did not directly cause the drastic reduction of the population abundance of *M. relicta* but indirectly facilitated predation by smelts, which was the final cause of the collapse. The high predation rate by smelts was probably accelerated by the emergence of chaoborid larvae, which were important food items for smelts in early summer.

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