

Elevated temperature causes metabolic trade-offs at the whole organism level in the Antarctic fish *Trematomus bernacchii*

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As a response to ocean warming, shifts in fish species distribution and changes in production have been reported, that have been partly attributed to temperature effects on the physiology of animals. The Southern Ocean hosts some of the most rapidly warming regions on earth and Antarctic organisms are reported to be especially temperature sensitive. While cellular and molecular organismic levels appear to, at least partially, compensate for elevated temperatures, consequences of acclimation to elevated temperature for the whole organism are often less clear. Growth and reproduction are the driving factors for population structures and abundances. The aim of this study was to assess the effect of long-term acclimation to elevated temperature on energy budget parameters in the high Antarctic fish *Trematomus bernacchii*. Our results show a complete temperature compensation for routine metabolic costs after nine weeks of acclimation to 4°C. However, an up to 80% reduction in growth was measured at 2 and 4°C compared to the control group at 0°C. With regard to a predicted temperature increase of up to 1.4°C in the Ross Sea by 2200, such a significant reduction in growth is likely to affect population structures in nature e.g. by delaying sexual maturity and reducing production, with severe impacts on Antarctic fish communities and ecosystems.