

SCIENTIFIC REPORT	
Reference	Short Term Scientific Mission COST Action FA1304
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STSM Title	The cardiorespiratory ability of Arctic char and brown trout to respond to environmental warming

Summary

The purpose of the current study was to investigate the cardiorespiratory ability of Arctic char and brown trout to respond to environmental warming. These species are competing for the same habitats both in Northern Norway and in Eastern Finland. Environmental warming could influence this competition and the availability of suitable habitats for both species i.e. distribution of species could change due to climate change. Furthermore, as the migration occurs in the warmest time of the year, climate change might have detrimental effects on fish stocks. Therefore, the aim was to investigate the maximum cardiovascular capacities of Arctic char and brown trout that migrate to residents that stay in the lake the whole season (or life). We were studying fish during the river migration and resident fish from the same species from a lake. The maximum cardiac capacity is related to swimming capacity i.e. ability of fish to complete migration. Furthermore, the cardiac capacities are also related to thermal tolerance of these fish species. Besides the cardiac capacities the aim was to study the swimming speed and location of the fish with acoustic telemetry tags. The purpose was to relate the maximum cardiac capacity in given temperature to actual movement activity in the natural habitat which has not been studied before.

The results of the measurements that have been analysed so far are already quite devastating. The river temperature during the migration was between 12.1-12.4 °C. The fish were shockingly close to the capacities they can handle. Both species during river-part of the migration got cardiac arrhythmias between 14-18°C. For the major part of the fish this was only 2 °C higher than current river temperature. Interestingly the thermal tolerance of resident fish was significantly higher: 19-26 °C. The results from the upstream migration show that the fish have limited capacities to handle high temperatures when they need efficiently working cardiac capacities most (to pass through rapids etc.). The increase of the environmental temperature could, thus, be extremely detrimental for these fish. Our further analyses will show what the changes in the cellular level are and we are also able to relate the cardiac results to swimming capacity.

Thank you for enabling this coworking project!

