



Modelling of surface-water temperature for the estimation of the Czech fishery productivity under the climate change

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Freshwater fish production is significantly correlated with water temperature which is expected to increase under the climate change. This study is dealing with the estimation of the change of water temperature in productive ponds and its impact on the fishery in the Czech Republic. Calculation of surface-water temperature which was based on three-day mean of the air temperature was developed and tested in several ponds in three main fish production areas. Output of surface-water temperature model was compared with measured data and showed that the lower range of model accuracy is surface-water temperature 3°C, under this temperature threshold the model loses its predictive competence. In the expecting of surface-water temperature above the temperature 3°C the model has proved the well consistence between observed and modelled surface-water temperature (R 0.79 – 0.96). Verified model was applied in the conditions of climate change determined by the pattern scaling method, in which standardised scenarios were derived from five global circulation models MPEH5, CSMK3, IPCM4, GFCM21 and HADGEM. Results were evaluated with regard to thresholds which characterise the fish species requirements on water temperature. Used thresholds involved the upper temperature threshold for fish survival and the tolerable number of days in continual period with mentioned threshold surface-water temperature. Target fish species were Common carp (*Cyprinus carpio*), Maraena whitefish (*Coregonus maraena*), Northern whitefish (*Coregonus peled*) and Rainbow trout (*Oncorhynchus mykiss*). Results indicated the limitation of the Czech fish-farming in terms of i) the increase of the length of continual periods with surface-water temperature above the threshold appropriate to given fish species toleration, ii) the increase of the number of continual periods with surface-water temperature above the threshold, both appropriate to given fish species toleration, and iii) the increase of overall number of days within the continual period with temperature above the threshold tolerated by given fish species.

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