

Micro-scale heterogeneity in water temperature

HF Dallas^{1*} and NA Rivers-Moore²

¹*Freshwater Research Unit, University of Cape Town, Private Bag X3, Rondebosch, 7700, South Africa*

²*PO Box 152, Hilton, 3245, South Africa*

Abstract

Micro-scale heterogeneity in water temperature was examined in 6 upland sites in the Western Cape, South Africa. Hourly water temperature data converted to daily data showed that greatest differences were apparent in daily maximum temperatures between shallow- and deep-water biotopes during the warmest period of the year. Pool depth affected water temperature with deeper pools creating a more stable thermal environment. Groundwater-dependency affected water temperature differences with less groundwater-dependent rivers exhibiting greater differences in daily maximum temperatures. The importance of maintaining instream and riparian habitat, including pools, undercut banks, marginal vegetation, and an intact hyporheos, is discussed, giving examples of organisms utilising such habitats as thermal refugia. Considerations when choosing an appropriate model to simulate water temperatures, including groundwater-dependency, temporal and spatial scale, and study objectives, are discussed.

Keywords: water temperature, riverine ecosystems, rivers, thermal regimes, biotic responses, aquatic organisms, micro-scale heterogeneity, modelling