



Community Structure and Algal Feeding Preferences of Zooplankton in Myponga and South Para Reservoirs

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ABSTRACT

Zooplankton community structure was studied monthly in Myponga and South Para Reservoirs in South Australia from January 2008 to June 2009. Myponga Reservoir is a highly managed reservoir with prolonged artificial mixing while South Para Reservoir is non-managed and has less human perturbation. The total number of taxa in Myponga and South Para Reservoirs were 16 and 20 respectively. Cladocera was the dominant taxonomic group in relation to the total number of taxa but in terms of total density, Copepoda were the numerically dominant group in both reservoirs. The most frequently occurring Cladocera were *Ceriodaphnia* cf. *quadrangula*, *Ceriodaphnia cornuta* and *Bosmina meridionalis* while *Asplanchna priodonta* was the predominant Rotifera throughout the study. Copepoda were dominated by *Calamoecia ampulla* and *Microcyclops* sp., making up the largest portion of total zooplankton density. Differences with regard to species richness were due to the sole occurrence of *Polyarthra dolichoptera*, *Keratella slacki*, *Anuraeopsis fissa* and *Pompholyx complanata* in South Para Reservoir.

Observations showed relatively consistent species diversity and density throughout the study in Myponga Reservoir except for low densities during summer for Cladocera and Copepoda groups while seasonal variations in zooplankton composition and abundance are features of South Para Reservoir. Shallow locations have greater zooplankton densities compared to deep locations in both reservoirs. Nevertheless, vertical migration in shallow locations was inexplicit as compared to deep locations in Myponga Reservoir.

Physico-chemical factors particularly water temperature and biological factors including the occurrence of green algae and cyanobacteria may influence zooplankton abundance and the

dynamics of the community. Thermal stratification and circulation resulted in brief population dispersion and consequently had a fluctuation of seasonal distribution pattern of zooplankton. Both horizontal gradients and stratification are strong factors enhancing zooplankton richness at South Para Reservoir.

The functional responses of *Daphnia carinata*, *D. lumholtzi* and *Ceriodaphnia* cf. *quadrangula* to six algal species at three concentrations are described. The ingestion and filtration rates were measured by Low Revolutions per Minute Tumbler (LRPMT) for 2 hours at 20°C. Ingestion and filtration rates varied with algal species and concentrations. *Daphnia carinata* removed algal cells at a higher rate than other two species when feeding on uni- and multi-algal species suspensions. Quantitative differences in the rate of food intake were found in suspensions of *Ankistrodesmus falcatus*, *Scenedesmus obliquus*, *Chlorella vulgaris*, *Chlamydomonas reinhardtii*, *Anabaena circinalis* and *Microcystis flos-aquae*. Small cells of green algae were more readily ingested by grazers. Ingestion rate increased linearly with cell concentration up to a maximal rate. Comparison of the ingestion rate on a green and blue-green algal mixture demonstrated the importance of edible algae in zooplankton selective feeding. Filamentous *Anabaena circinalis* and colonial *Microcystis flos-aquae* were less favourable as food particularly in a multi-algal suspension. In contrast, both these blue-green algal species can also be utilized by the grazers when presented as a unialgal suspension although these species were previously reported to have lethal toxic effects on cladocerans. Therefore, a management strategy using cladocerans for controlling undesirable cyanobacteria is contemplated to be necessary in the future. As the grazing rates would be correlated with zooplankton taxonomy composition, monitoring data is important in order to know the dominant zooplankton taxa in the reservoirs.

DECLARATION

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Azma Hanim Ismail

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