ABSTRACT

Lake Victoria witnessed mass extinction of native fish species that coincided with introductions of *Lates niloticus* and *Oreochromis niloticus* about five decades ago. Small populations of *O. esculentus* and *O. variabilis* that are locally extinct in L. Victoria are found in Lake Kanyaboli, a satellite lake of L. Victoria. L. Kanyaboli thus has potential to serve as a refugium where cichlid relics are protected from the invasive *L. niloticus*. However, the status and thus factors that may negatively impact the survival of the two cichlids are presently not known. In addition, although a dyke that divides the lake into two components was constructed in 2003, its effects on key trophic levels such as phytoplankton species are not known. The goal of this study was to investigate physicochemical factors and effect of the dyke that may constrain the conservation of both *O. esculentus* and *O. variabilis* in L. Kanyaboli. Specifically, the study aimed to: compare present and previous estimates of temperature, dissolved oxygen (DO), pH and turbidity; determine whether temperature, dissolved oxygen, pH and turbidity predict the distribution of *Oreochromis esculentus* and *O. variabilis*; compare size of *O. esculentus* and *O. variabilis* in the lake against their respective sizes published by International Union of Conservation of Nature (IUCN); and determine effect of the dyke on phytoplankton species diversity in L. Kanyaboli. Levels of DO, pH, temperature using Environmental Multiparameter Monitoring System YSI Hydrolab and Secchi depth were measured using Secchi disk and compared to previous estimates from the lake to determine the extent which the four physicochemical factors have changed and whether they predicted the distribution of each of the two species. The study employed a cross-sectional study design. Lengths of fish caught during the study were measured and compared against respective lengths of each species published the IUCN. Diversity of phytoplankton was determined from water samples. The study found that DO and temperature are decreasing but pH and Secchi depth are increasing, which suggests that quality of water in the lake is deteriorating. The results showed that Secchi depth was positively proportional to the abundance of *O. variabilis* ($z = 2.000, p < 0.0455$). None of the four physicochemical factors predicted the distribution of *O. esculentus*. The results also showed that *O. esculentus* and *O. variabilis* in L. Kanyaboli were significantly shorter than their respective lengths published literature by IUCN ($t = -19.564, p < 0.0001$ and $t = -45.960, p < 0.0001$ respectively). The small size of fish may arise from high fishing pressure and deteriorating quality of the water. Results on the effect of the dyke showed that the western component of the lake had a lower phytoplankton species diversity compared to the smaller component, $H = 3.033$ vs. $H = 1.281$. All species of phytoplankton that were abundant in the larger component are associated with polluted waters. In contrast, species that were more abundant in the smaller component of the lake are associated with relatively less polluted waters. Results on phytoplankton species diversity suggest that the two components of the lake may be under different limnological processes. In the aggregate, conservation efforts should aim at improving water quality and regulating both fishing effort and fishing gear in Lake Kanyaboli so as to safeguard its roles as a biological refugium for endangered fishes in L. Victoria.