

Abstract

Alcolapia is a minor genus of small-bodied, polymorphic cichlids inhabiting the lagoons and hot springs surrounding the soda lakes Natron (largely in Tanzania) and Magadi (Kenya). Three *Alcolapia* species are present at Natron (*Alcolapia alcalicus*, *Alcolapia ndalalani* and *Alcolapia latilabris*) and one at Magadi (*Alcolapia grahami*). All are IUCN Red Listed as either vulnerable or endangered. We performed analyses of morphometric and genetic structure on 13 populations of the Natron *Alcolapia* flock, and one *A. grahami* population of Lake Magadi as an out-group. Morphometric analyses revealed significant differentiation in the head and mouth shape of the species at Natron. From a genetic perspective, among 70 mtDNA control region sequences 17 haplotypes were found, showing in the minimum spanning network a star-like pattern around the widespread haplotype 2lat. At Natron, there was limited genetic differentiation between the different populations of *A. alcalicus* and *A. latilabris*, despite apparent ecological barriers of extreme alkalinity that suggested their populations were isolated. Instead, there appeared to be some population connectivity, with a rate of 0.5–2.3 migrants per generation suggesting that natural factors, such as intense rains or transmission by large piscivorous birds, facilitate population connectivity and maintain genetic similarity. The outputs of high population connectivity and one genetic unit at the basin level (despite morphological divergence) suggest that any human activities that disrupt the connectivity of the freshwater resources of the Natron catchment could further threaten the integrity and current status of these already threatened fish populations.