Conservation genetics of tilapias: Seeking to define appropriate units for management

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Abstract

Tilapias comprise 112 species and subspecies of cichlid fishes of the genera Oreochromis, Sarotherodon, and Tilapia. Because of the importance of tilapias to aquatic ecosystem structure and function, fisheries, and aquaculture, it is critically important to conserve wild genetic resources. Of the 112 recognized tilapia taxa, 41 are regarded as imperiled. In order to manage adaptively important genetic variation in tilapias, we need to recognize and define biologically appropriate units of conservation. An evolutionary significant unit (ESU) can be defined as a population or group of populations that merits priority for conservation and separate management because of high genetic and ecological distinctiveness from other such units. Management units (MUs) are defined as populations that are demographically independent of one another; that is, their population dynamics depend mostly on local birth and death rates, and not on genetically effective migration. Identification of MUs – similar to “stocks” widely referred to in fisheries management – is useful for short-term management, such as managing habitat, delineating fishing areas, setting harvest rates, and monitoring population status. Against this background, the goal of our review and synthesis was to summarize knowledge and recommend critical work yet to be done regarding conservation of tilapias, approaching this task in a species-by-species manner. With the exceptions of Oreochromis niloticus, O. mossambicus, and Sarotherodon melanotheron, the body of existing work regarding genetic and adaptive differentiation of populations of tilapias is insufficient to inform identification of evolutionary significant units, a knowledge gap that should be addressed by targeted research. We note that competition and interspecific hybridization caused by introductions of tilapias for aquaculture purposes jeopardizes the genetic resources of certain native tilapia species. We hope that our review and synthesis spark critical discussion of tilapia conservation within the tilapia aquaculture, management, and conservation communities.

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