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Bioinformatics tool identifies hybrid tilapia species

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By Responsible Seafood Advocate

New tool offers accurate, affordable solution to monitoring local biodiversity

A new genomics marker tool has been shown to precisely identify tilapia species and distinguish hybridization between invasive and native tilapia species. In collaboration with the Tanzania Fisheries Research Institute, Roehampton University, Bangor University, the University of Bristol and the University of East Anglia in the United Kingdom, the Earlham Institute led the development of an optimized design based on 96 single nucleotide polymorphisms (SNPs) biomarkers, which proved to be more accurate than microsatellite or morphological identification of interspecific hybrids.

“It’s important to be able to spot these hybrids, yet it’s unreliable to separate them from pure tilapia species by physical characteristics alone,” said lead author Dr. Adam Ciezarek, Postdoctoral Scientist in the Haerty Group at the Earlham Institute. “We have shown that it is possible to identify them using full-genome data. Crucially, we have also demonstrated that a vastly reduced set of 96 SNPs can perform just as well – with greater efficiency and precision, and at a much lower cost.”

The novel SNP markers provide an important resource for assessing broodstock purity in fishery hatcheries, helping to conserve endemic biodiversity. It’s a more affordable and convenient tool that can be used to accurately assess potential farm stocks, as well as survey natural water bodies for evidence



A new bioinformatics tool can precisely identify tilapia species and pinpoint hybridization between invasive and native tilapia species. Photo courtesy of the Earlham Institute.

of hybridization between tilapia.

In particular, the research team is hopeful that the tool could help develop aquaculture and empower conservation in Tanzania, Africa – a hotspot of natural diversity for tilapia species. At least eight fully endemic *Oreochromis* species are found in Tanzania and an additional 12 species that are endemic to catchments shared with neighboring countries. Several of these species are adapted to unique environmental conditions (e.g., elevated temperatures, salinity, and pH) and could be of interest for future aquaculture developments.

“Case studies indicate several locations where introduced aquaculture species have become established in the wild, threatening native *Oreochromis* species in Tanzania,” said lead co-author Prof George Turner, School of Natural Sciences at Bangor University. “At present, native *Oreochromis* species are poorly characterized, and their conservation could benefit from the identification of purebred populations for protection.”

“Such safeguarding of the wild relatives of farmed species would also protect unique genetic resources that could be used to enhance traits in cultured *Oreochromis cichlid* strains.”

The peer-reviewed paper, '[Whole genome resequencing data enables a targeted SNP panel for conservation and aquaculture of Oreochromis cichlid fishes](https://www.sciencedirect.com/science/article/pii/S0044848621013004)'

(<https://www.sciencedirect.com/science/article/pii/S0044848621013004>), was published in *Aquaculture*. The study was funded by the UKRI Biotechnology and Biological Sciences Council, the Royal Society and the Leverhulme Trust.

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