

## Population genomic analysis of yellowfin tuna *Thunnus albacares* off South Africa reveals need for shifted management boundary

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Yellowfin tuna *Thunnus albacares* is a commercially and economically important species in global and South African fisheries. South African yellowfin tuna catches are assessed and managed as part of two discrete stocks; individuals caught west of 20°E (off the Western Cape province) are included in the International Commission for the Conservation of Atlantic Tunas (ICCAT) stock, and those caught east of this boundary included in the Indian Ocean Tuna Commission (IOTC) stock. This boundary does not incorporate population structure of species, despite the importance of species' management units reflecting biological structure for sustainable harvesting. This study investigated the fine-scale population structure of yellowfin tuna off South Africa. Yellowfin tuna exhibits shallow genetic differentiation over wide geographic areas, resulting in limited power of traditional genetic approaches to resolve genetic structure relevant to fisheries management. Genome-wide analysis of single nucleotide polymorphisms (SNPs), discovered using next-generation DNA sequencing, was thus employed for increased statistical power to detect neutral structuring reflecting population connectivity and to detect signatures of local adaptation. Neutral SNP loci revealed significant structure within the dataset ( $F_{ST}=0.0043$ ;  $P<0.0001$ ); partitioning of differentiation indicated significant differentiation between yellowfin tuna from the Western Cape and the eastern Atlantic Ocean, with no significant differentiation between individuals from the Western Cape and Western Indian Ocean regions. Positive outlier SNPs supported this pattern suggesting individuals from these regions may be locally adapted as well as demographically isolated. It is suggested that yellowfin tuna caught off the Western Cape of South Africa are migrants from the Indian Ocean population, and should be included in the assessment and management of the Indian Ocean stock by the IOTC.