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Intraspecific genetic variation in the percoid teleosts *Argyrosomus japonicus* (Temminck & Schlegel, 1843) and *Pomadasys commersonnii* (Lacepède, 1801), as inferred from the mitochondrial control region

by

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Thesis Abstract

Dusky kob, *Argyrosomus japonicus* and spotted grunter, *Pomadasys commersonnii* occur off South Africa's southern and eastern seaboard. They are the preferred target species for both shore and estuarine anglers. In order to sustain the billion rand recreational angling industry, healthy fish populations are of the utmost importance. However, *A. japonicus* is currently overexploited, with the species' spawner biomass estimated at 1–4.5% of pristine levels. *Pomadasys commersonnii* spawner biomass is estimated at 40% of pristine levels, thus indicating that the species is not overexploited. For effective management of our marine resources, information about the population size, structure, dynamics and population history of individual species is needed. Genetic data can make a valuable contribution to a holistic stock determination approach, as powerful tools in unravelling population history. Genetic variation gives a reflection of the evolutionary differences within and between populations and allows for indirect assessment of population connectivity and gene flow levels.

The mitochondrial DNA (mtDNA) control region is a useful marker in population studies, due to its high substitution rate. The haploid nature of the mtDNA, maternal inheritance and the absence of recombination, means that the signal obtained from genetic drift is stronger than that for nuclear loci. For this reason the mtDNA control region was analysed for 133 juvenile

A. japonicus and 139 *P. commersonnii* samples from four localities along their South African distribution, to determine the genetic diversity and differentiation among the coastal regions. Juvenile *A. japonicus* are resident around their natal estuaries until they reach sexual maturity. This residency of juveniles makes them ideal candidates to give a reflection of *A. japonicus* population dynamics, especially to determine if any isolation-by-distance exists along the coast. In the case of *P. commersonnii*, both juveniles and adults were analysed, since adults are resident around their natal estuaries when not undertaking spawning migrations.

High levels of genetic diversity were found in both *A. japonicus* and *P. commersonnii*, comparable to that observed in other marine fish species. No significant population differentiation results were obtained, possibly due to the small sample sizes collected or to lack of resolution in the marker. In *A. japonicus*, where spawning is known to occur off KwaZulu-Natal and off the southern Cape coast, possible isolation-by-distance was detected. This indicates that the adult *A. japonicus* population probably does not consist of one freely intermixing unit, but rather of geographically separated spawning units. For *P. commersonnii*, where spawning has only been recorded off the KwaZulu-Natal coast, no population differentiation was observed, indicating that the different regions along the South African coast are highly connected.

In conclusion, through future analysis of larger sample sizes, preferably from single cohorts, some of the noise will be reduced and more conclusive answers with respect to female gene flow could be provided. In the case of *A. japonicus* the use of microsatellite markers which are better at detecting fine-scale differentiation and provide estimates of total gene flow, will be informative. At a broader geographic scale, it will be important to assess differentiation among Dusky kob populations from throughout the Western and Eastern Indian Ocean. As far as *P. commersonnii* is concerned, it is recommended that a comparison be undertaken to determine the relationship of the South African population to that found along the Mozambican coast.

DECLARATION

I declare that the dissertation, which I hereby submit for the degree Magister Scientiae at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

Signature : ..... Date : 4/08/2005.....

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