Implications of uncertain taxonomy for conservation management: case studies on bandicoots and gliders

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It is often assumed that the taxonomy (species and subspecies classifications) and distribution of our native mammal fauna are now well established. However, even for very well-known species of conservation significance this assumption may be entirely wrong, with major issues for their conservation management. To illustrate this point we present some of our recent genetics research on southern brown bandicoots (*Isoodon obesulus*) and petaurid gliders from northern Australia.

Mitochondrial (mtDNA) and nuclear gene sequence analyses of *I. obesulus* revealed that there is a major phylogenetic split within I. obesulus, with the SA Mt. Lofty Ranges, Kangaroo Island and Franklin/St Francis Island populations grouping with populations of *I. obesulus* and *I. auratus* from Western Australia and a second group comprising *I. obesulus* from south-east SA, Victoria, NSW and Tasmania. MtDNA analyses further showed that all Tasmanian samples formed a distinct evolutionary lineage (monophyletic group of haplotypes) to the exclusion of all other mainland samples of *I. obesulus*. The level of sequence divergence among these lineages suggests that the Tasmanian population has been genetically isolated from the mainland population, potentially over hundreds of thousands of years, including multiple ice age cycles. Support from nuclear gene analyses for the distinction of the Tasmanian population was absent, possibly due to the low intra-specific variation in the nuclear genes used in our study. Taken overall, the results lend support for the separate sub-specific status of the Tasmanian population and further suggest that *I. o. obesulus* is limited in its distribution to NSW, Victoria and south-east SA. The latter represents a significant reduction in the known range of this subspecies.

Similar genetic analyses of petaurid gliders from the Northern Territory, previously thought to be a subspecies of *Petaurus breviceps*, revealed the existence of an entirely new evolutionary lineage of gliders that is likely to represent a distinct species, and preliminary evidence that an additional divergent evolutionary lineage may also exist in the Kimberley region of Western Australia. Morphological analyses are currently underway to further test the hypothesis of a new glider species in northern Australia. Together with recent genetic studies of other marsupials (e.g. rock wallabies of the genus *Petrogale*, *Sminthopsis griseoventer* from SA and *Petaurus australis* from northern QLD), it is apparent that there is still much to learn about the taxonomy and distribution of the Australian mammal fauna, particularly from northern Australia. The implications for their conservation management are further discussed.

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Conservation status of plants in South Australia: Challenges and trends

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The last revision of the threatened species schedules under the South Australian *National Parks and Wildlife Act 1972* were gazetted in February 2008, and the revision before that was in 2000. The changes incorporated in the revised schedules in 2008 arose from workshops held between 2002 and early 2003. Those workshops only reviewed species already listed as threatened and a limited number of others that had been documented as "of conservation concern". A discussion paper entitled "2003 Review of the Status of Threatened Species in South Australia: Proposed Schedules under the South Australian *National Parks and Wildlife Act 1972*" was then made available for public comment, and a significant number of responses were received. Further assessments were undertaken and the draft schedules were amended for several additional species. It then took a further three years to take the proposed revised schedules through government processes, including a sub-committee of Cabinet, to the final gazettal stage.

Between 2008 and 2014 the conservation statuses of all of South Australia's known native vascular plant and vertebrate animal taxa were assessed at IBRA sub-regional levels for each of the State's eight NRM regions. Assessments were made by panels of taxonomic experts and local naturalists who applied the widely-accepted, IUCN Red List criteria for deriving regional status. The panels drew on their own field knowledge and also accessed plots of vouchered records held by the State Herbarium of South Australia and data from the Biological Databases of South Australia (BDBSA).

This process served four main purposes. Firstly, it provided the first State-wide check of distribution data for all recognised native vascular plant (and vertebrate animal) taxa. It identified many likely database location errors that were then checked to ensure a "clean database" was available for all users. It also enabled workshop participants to gain a much better appreciation of what location (and other) information has been documented for each species and to identify "missing" or overlooked location

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