Submission to the Senate Enquiry on "The Effectiveness of Threatened Species and Ecological Communities Protection in Australia"

Senate Standing Committees on Environment and Communications

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Subject: Australia needs a Genome Resource Bank (GRB) for Wildlife Biodiversity Conservation

I wish to make a submission to the Enquiry arguing that Australia needs the capacity to store and retrieve the genomes of our native wildlife (aquatic and terrestrial vertebrates and invertebrates) for the conservation of biodiversity. I make the following points and use native amphibians as an example (but the argument applies to all native freshwater and terrestrial vertebrate wildlife):

- Australia lacks a national identifiable, functional genome storage facility for native vertebrates; a recent initiative (Frozen Repository for Great Barrier Reef Coral; Cryobiology 65 (2012) 157–158) has commenced a genome storage facility for marine invertebrates (corals). Previous attempts to initiate a vertebrate genome storage facility have failed or are mothballed because of lack of funding and infrastructure eg the well known Animal Gene Storage and Resource Centre of Australia based at Monash University, and led by Dr Ian Gunn.
- Australia has no organised network of institutions, researchers, or other potential stakeholders committed to or involved in the ***retrievable storage of wildlife genomes***, despite Australia having enormous intellectual capacity, scientific expertise and potential infrastructure (zoos, museums, biomedical and agricultural genome storage facilities) that could participate and contribute [By retrievable storage of genomes, I mean the storage of sperm, eggs, embryos or other cells that can be used to derive live animals; in this context, the extensive frozen banks of tissues in our major Museums that have not been cryopreserved, but merely placed in cold storage, and are therefore, in the absence of radical procedures such as nuclear transfer, not capable of deriving live animals, are not considered to be retrievably stored genomes].
- Australian botanical gardens participate in national and international schemes to store the genomes of plants ie seed banks eg the Millennium Seed Project/National Herbarium of Victoria, Melbourne Botanical Gardens. This is main stream plant biodiversity conservation. This leads to the question why is there no equivalent strategy for animals? Are we less concerned about the extinction of animals than plants?
- Amphibians as an example. Australia has officially lost four species of amphibians (listed under the EPBC Act as extinct) in recent decades (not the distant past!). Adequate storage of the genomes of these species prior to their rapid, unanticipated decline and extinction would have prevented those species becoming extinct. The Federal Department of SEWPAC recognises a role for genome storage in managing the current amphibian extinction crisis

(see Threat Abatement Plan, Infection of Amphibians with Chytrid Fungus, DEH, 2006, Action 2.1.5) and has published a proposal for an amphibian genome bank, accessible via its website [http://www.environment.gov.au/biodiversity/invasive/publications/pubs/frogs-captive-breeding-appendix2.pdf].

- Many other native vertebrates are threatened with extinction, or the loss of a major component of their genetic diversity from freshwater fish to reptiles, birds and mammals.
- Climate Change will accelerate the rate of extinction, but is only one of many threats to biodiversity, such as invasive species, emerging diseases, habitat loss. In many cases over the next century, a National Biodiversity Genome Storage Facility may be the difference between persistence of a number of species and extinction.
- The development of a National Genome Storage Network for Wildlife Biodiversity is a major sub-programme in the current CRC for Safeguarding Biodiversity bid; The CRC would facilitate networking amongst stakeholders and potential participants, provide supporting research and technical expertise, and be an advocate and facilitator for the establishment of a National Wildlife Biodiversity Genome Storage Facility (or network of facilities). The Biodiversity CRC would not run or manage the facility (since CRC's have limited life) but one of the Biodiversity CRC legacies would be a functioning, effective Wildlife Genome Resource Facility with multiple end-users and participants.
- Urgent action, not delay or prevarication, is required!