

Wildlife Conservation and Perth Zoo.

H. M. Robertson
Director Animal Health and Research
Perth Zoological Gardens, 20 Labouchere Road, South Perth 6151
Email: helen.robertson@perthzoo.wa.gov.au

ABSTRACT: *This presentation outlines some of Perth Zoo's research and wildlife conservation projects in particular native species breed for release programs and a new frog conservation research program. The current breed for release programs for Western Swamp Tortoise, Dibbler and Numbat, are described as well as a summary of past programs. The Numbat program is of particular interest as it includes a pre-release predator awareness training component which appears to be having a positive effect on survival of the released Numbats. Chytrid fungus is threatening amphibians on a global scale. Climate change and habitat destruction are also impacting on our amphibian fauna. This has resulted in the very real possibility that we may lose an entire order of animals to extinction in our lifetime. To assist in addressing this crisis, Perth Zoo has established an amphibian breeding and research program focused on threatened frog species of Western Australia. Perth Zoo is also involved in a number of wildlife health veterinary teaching and research programs which contribute to the conservation of our threatened wildlife.*

KEYWORDS: Research, wildlife conservation, breed for release, frog, in-situ.

Introduction.

Zoos can play a major role in wildlife conservation. This role can vary from captive breed for release programs to research into reproductive biology, education of the public about threatening processes and participation in, or funding of, in-situ conservation actions.

In the United States it has been recognised that despite good endangered species legislation (the 1073 Endangered Species Act), the dedication and hard work of many professionals and a large amount of time and money, there are very few success stories (Clarke et al 1994). Clarke (1994) also says...*"The ability of an organisation to solve endangered species problems is a product of their structure, culture, and managerial systems as well as the setting in which they operate"*.

At Perth Zoo the approach taken is that the more collaborative and integrated a manner this role is conducted with other institutions, and within our own institution, the more likely it is that the outcomes will be successful and significant.

So – what are we doing?



Recovery Teams and Breed for Release Programs.

With any collaborative or joint project, it is important to have, up front, an agreed method of working together, with agreed goals and responsibilities. To facilitate this we have now formalised our work with our current in-situ threatened species recovery programs through the development of Memoranda of Understanding (MOUs) with the Western Australian Department of Environment and Conservation (DEC). Each Recovery Team has a different make-up of people and expertise dependent on what is required for the species. These MOU's clearly outline what each party (eg DEC and Perth Zoo) have agreed to do in relation to the captive breeding and reproductive research of each species. These include such things as providing funding for keeping staff or animal food, providing a certain number of animals for release each season or researching a particular aspect of the species biology. Perth Zoo has been involved with 9 captive breeding programs during the last 10 years in collaboration with the Department of Environment and Conservation (DEC) who maintain introduced predator (eg fox and cat) control in release sites and also monitor released animals (Fletcher and Morris 2003).

Chuditch: With 315 captive bred Chuditch released into predator protected habitat initiating 5 new populations, the Chuditch captive breeding program is now complete. Our partners in this program were DEC (then CALM), Alcoa and WWF. DEC continue to monitor the new populations in the field. During the life of this program an honours and a PhD student, in collaboration with Perth Zoo staff determined and documented differing aspects of the reproductive biology of this species.

Shark Bay Mouse: Between 1997 and 2002 a total of 346 Shark Bay Mice bred at Perth Zoo were released into protected habitat firstly at Doole Island, WA, and then at North West Island, WA. 114 were bred for the Australian Wildlife Conservancy for release onto Faure Island. At that point the goals of the recovery team regarding breed for release and development of new populations were met and the breeding program was complete. Our partners in this program were DEC (then CALM), Western Australia Threatened Species and Communities Unit (WATSCU) and Mid West Region, CSIRO Division of Wildlife and Ecology, Useless Loop Community Biosphere Project Group, Inc. Environment Australia and the Australian Wildlife Conservancy. During this breeding program, an honours student investigated and documented the reproductive biology of this species.

Greater Stick-nest Rat: The captive population of Greater Stick-nest Rats at Perth Zoo was established to provide animals for release in Western Australia. The captive population was found to have two disease problems which, upon investigation, were also present in the captive population in South Australia and the population in the wild. The disease condition/s involved kidney disease and failure and cataract formation that eventually involved the whole eye and led to permanent blindness. From analysis of the studbook the disease appeared to be genetically inherited. The recovery team decided that all future animals for release should come from the island populations rather than captive breeding programs so the program was closed down. Our partners in this project were; DEC (then CALM), Monarto, SA Dept of Environment and Heritage.



Lancelin Island Skink: One hundred and fifty two captive bred Lancelin Island Skinks have been bred at Perth Zoo and released onto Favourite Island on the WA coast in Jurien Bay.

DEC are currently monitoring the released animals to determine whether they are persisting and breeding prior to any further captive breeding efforts. Some released skinks were observed and recaptured in 2004. March 2005 saw two neonates and one adult captured and this year two females and a juvenile, so they seem to be persisting however it is difficult to determine whether they are thriving – they are a very difficult species to capture.

Our partners for this program are: DEC, Environment Australia, Shire of Gingin, WA Museum and WA Society of Amateur Herpetologists.

Numbat: 135 captive bred Numbats had been released into predator protected sites in WA. This program has involved some innovative predator awareness training developed by Perth Zoo staff that has resulted in a 50% increase in the survivorship of released animals in the wild.

Our current partners in this program are; DEC and World Wide Fund for Nature. During this breeding program a number of studies have been conducted into the biology of this species including their reproductive biology, their eyesight and their physiology/metabolism.

Dibbler: Between 1998 and 2001 a total of 88 captive bred “Island” Dibblers were released onto Escape Island in Jurien Bay. Since 2001 over 200 captive bred ‘mainland’ Dibblers have been released into Peniup Reserve in the SW of WA and also into the Stirling Range National Park.

Our partners in this program are; DEC, Malleefowl Preservation Group, South Coast Community, Jurien Community, University of Western Australia, Sydney University. This species has been subject to a very thorough investigation into their reproductive biology through four projects conducted by Perth Zoo staff, two Honours students and a PhD student.

Western Swamp Tortoise: A total of 394 Western Swamp Tortoise bred at Perth Zoo have been released into protected habitat in the wild since 1988. Critical success factors to the success of this breeding program were the development of a suitable artificial captive diet (turtle pudding) and being able to determine which females were in breeding condition.

Our partners in this program include; DEC, University of WA, WA Water Authority and the World Wide Fund for Nature Australia.

Central Rock Rat: This species was last sighted in the wild on July 2002 (pers. comm. Glenn Edwards). The captive colony held at Alice Springs Desert Park have produced 43 young with 19 surviving to adulthood since breeding commenced in 1997. The captive colony at Perth Zoo commenced in 2001 and produced 27 young all of which were successfully weaned.

Breeding of this species then ceased due to space restrictions. Eighteen months later breeding was re-established and one female produced three litters. Of the 10 young produced only 6 survived (two from each litter).



DEC now wish to begin re-establishing this species in secure habitat. Perth Zoo attempted to restart breeding in the aged animals using several methods including flushing, mate swapping, adjusting photoperiod and chemical and hormonal stimulation. All these attempts, carried out over an eighteen month period werewithout success. The remaining Central rock Rats were recently moved to Alice Springs Desert Park where it was hoped that experiencing a season's rain depressions and living in large outdoor enclosures might initiate breeding – so far there has been no success. Our partners in this program were CALM (now DEC), Alice Springs Desert Park and Northern Territory Department of Planning and Infrastructure.

Sandhill Dunnart: The ecology of the Sandhill Dunnart is being studied in the field through annual surveys by a group of Perth Zoo staff and volunteers. Research into the captive breeding of this species, including the determination of their reproductive cycles, their reproductive behaviour and the growth and development of their young is being conducted at Perth Zoo. This program does not have an MOU at present and has a purely research focus rather than a breed for release focus.

Amphibian Research Program: A new amphibian research program has commenced at Perth Zoo through funding received from the WA Office of Science and Innovation (~\$450,000 over 4 years). Goals include: Husbandry of analogue species to WA threatened frog species (leading to the study of the threatened species); captive breeding and growth and development studies of analogue species of WA threatened frog species (leading to the study of the threatened species); the induction of ovulation in frogs; the investigation of the reproductive tracts of frogs, including the presence of a sperm storage organ and the non-invasive collection of frog sperm and its cryopreservation..

A significant issue for amphibians world wide is Chytridiomycosis – a disease caused by *Batrachochytrium dendrobatidis* chytrid fungus . Some populations of amphibians seem able to live with this disease (it only causes a few deaths) while for other species 100% mortality can result. Chytrid fungus infects only keratinised skin and is thought to cause an amphibian's death through either disrupting the normal functioning of its skin and/or releasing a toxin into the animal's body. Tadpoles are not affected as they do not have keratinised skin however they can have infection on their mouthparts which are keratinised (Ref – the Tasmanian one!). Frogs affected by the disease tend to be lethargic, have poor appetites and may be seen sitting unprotected in the day. They may also have excess sloughed skin and patchy discolouration of their skin and may exhibit a slow righting reflex. Other issues facing our frogs are habitat destruction, climate change and the introduced cane toad .

Perth Zoo's frog research program is designed to develop husbandry and breeding techniques for WA's threatened species in order that should we be required to breed any of them for release, or maintain insurance populations we can do so. We are also investigating, through the research of our PhD students, methods of cryopreservation of frog gametes in order that we can preserve their DNA for the future.

Collaborators in the frog research program include Perth Zoo, DEC, Western Australian Museum, University of Western Australia and Murdoch University. This program is not the subject of an MOU however the roles and responsibilities of each partner is detailed and agreed through the grant agreement itself.



Veterinary Programs.

Perth Zoo has a unique teaching collaboration with Murdoch University School of Veterinary and Biomedical Science. Our staff teach a final year rotation called *Vet 530: Wildlife and Zoo Medicine Clinical Rotation*. Groups of fifth year veterinary students spend two weeks at the Zoo attending on-site lectures and accompanying the Vets and Vet Nurses on their rounds to learn about wildlife medicine. As a result of this initiative, around 84 students each year now graduate with sound background in wildlife medicine.

As well as teaching the fifth year students, Veterinary staff are also involved in teaching Postgraduate Veterinary students and mentoring and supervising the Veterinary Resident. The Veterinary Resident Program again involves a partnership with Murdoch University. The Veterinary Resident carries out a wildlife research project part time while also working at the Perth Zoo Veterinary Department part time.

The Veterinary staff are also involved in a number of collaborative conservation programs with DEC – the most significant being the Cockatoo Care Program. In this program injured Black Cockatoos are brought to the Veterinary Department by DEC staff for assessment, treatment and rehabilitation where possible. After being treated and rehabilitated at Perth Zoo's Veterinary Hospital, they are sent to registered carers until they have regained their strength and complete any long-term treatment. They are then moved to one of two carers who have properties close to the forest where flocks of cockatoos fly in the vicinity each day. The birds have access to very large flight aviaries where they regain their flight muscle strength before being released. The release is a soft one, where the cockatoos can return for food each day as long as they need to. Released birds appear to join the local flocks of wild cockatoos successfully. The Veterinary Department treats approximately 60 cockatoos each year. The most common wounds are from gun shot or vehicle accidents. Our new Veterinary Resident will be studying the rehabilitation and success in the wild of our cockatoos as part of her Masters degree research.

Conclusion.

Perth Zoo has deliberately set about constructing a collaborative and inclusive approach and structure to its conservation and research activities. The process has often been driven by staff on the ground, whose enthusiasm and drive has made the programs the successes that they are.

We believe that, in conjunction with our collaborators and partners, we are making a significant contribution to the conservation of threatened species in Western Australia.

Acknowledgments

I would like to sincerely acknowledge the great many Perth Zoo staff and external collaborators who have contributed their time, expertise and enthusiasm to the various programs and projects described above.



REFERENCES:

Berger L, Speare R. 1998 Chytridiomycosis: a new disease of wild and captive amphibians. ANZCARRT Newsletter: 1.

Clark, T.W., Reading R.P. and Clarke, A.L. Endangered species recovery: Finding the lessons, improving the process. Island Press, 450pp., Washington D.C. Covelo, California.

Fletcher T, Morris K. 2003. Captive breeding and predator control: a successful strategy for conservation in Western Australia. In: Holt WV, Pickard AR, Rodger JC, Wildt DE, editors. Reproductive Science and Integrated Conservation. Cambridge: Cambridge University Press. p 232-248.

Pounds JA, Bustamante MR, Coloma LA, Consuegra JA, Fogden MPL, Pru N, Foster, Marca EL, masters KL, Merino-Viteri A, Puschendorf R, Ron SR, Sanchez-Azofeifa GA, Still CJ, Young BE. 2006. Widespread amphibian extinctions from epidemic disease driven by global warming. Nature 439(12).

Taylor R, Edwards G. 2005. A review of the impact and control of cane toads in Australia with recommendations for future research and management approaches. In: Committee) NCTTarttVP, editor.

