Australian Native Mammals as Pets

A feasibility study into conservation, welfare and industry aspects

Pub. No. 10/072
Australian Native Mammals as Pets
A feasibility study into conservation, welfare and industry aspects

By Rosie Cooney, Rosalie Chapple, Sarah Doornbos and Stephen Jackson
Institute of Environmental Studies, University of New South Wales

October 2010

RIRDC Publication No 10/072
RIRDC Project No. PRJ-004398
Foreword

Australia’s biodiversity is in crisis, and innovative alternatives are urgently needed. Threats to survival of mammals in the wild in Australia have prompted the proposition that keeping native mammals as pets, rather than the current suite of primarily exotic predators, could contribute to conservation. This report assesses the feasibility of this proposal.

The study seeks to strategically inform the potential development of an industry based on use of native mammals as pets in a way that helps to ensure positive conservation and welfare outcomes. While the keeping of certain native reptiles, birds and amphibians as pets is reasonably well-established across Australia, private domestic keeping of most native mammals is currently prohibited in most states.

The Rural Industries Research and Development Corporation invests in new and emerging industries on behalf of government and industry stakeholders. New industries provide opportunities to be captured by rural producers and investors. They also provide avenues for farmers facing adjustment pressure to diversify and manage change. The establishment of new industries contributes to community resilience and regional development. Increasingly, new industries are also contributing to a distinctive regional character in rural Australia.

The desirability and practicability of a native mammal pet industry has been the subject of much debate and proposals to expand keeping of native mammals face substantial opposition. A diverse range of stakeholders holds varied and often-conflicting values and perspectives. This study provides the first comprehensive and balanced consideration of a complex issue that has to date lacked a well-informed debate. This report provides a valuable basis for review of policy and legislation relating to private keeping of native animals.

This project was funded from RIRDC Core Funds which are provided by the Australian Government.

This report is an addition to RIRDC’s diverse range of over 2000 research publications and it forms part of our New Animal Products program, which aims to accelerate the development of viable new animal industries.

Most of RIRDC’s publications are available for viewing, free downloading or purchasing online at www.rirdc.gov.au. Purchases can also be made by phoning 1300 634 313.

Craig Burns
Managing Director
Rural Industries Research and Development Corporation
About the Authors

Rosie Cooney is an ecologist and a biodiversity and environmental policy specialist. She is a researcher, lecturer and consultant affiliated with the Fenner School of Environment and Society at the Australian National University and the Institute of Environmental Studies at UNSW, and an active member of the IUCN – World Conservation Union Species Survival Commission’s Sustainable Use Specialist Group. She holds first class Honours degrees in Zoology and in Law from ANU and a PhD in Zoology from Cambridge, and has ten years experience in biodiversity policy research, analysis and development. She has worked for six years for international conservation organisations (based in Europe), including IUCN – The World Conservation Union and WWF, and for four years in Australia in research, teaching and consulting. Her work focuses on biodiversity conservation and sustainable use of natural resources, with a strong emphasis on finding approaches that both meet human needs and conserve biodiversity.

Rosalie Chapple is an ecologist who combines university teaching, research and consulting in ecosystem management and sustainability. She is a Visiting Fellow in the Institute of Environmental Studies at UNSW, and Executive Director of the Blue Mountains World Heritage Institute. She has a BSc from the University of Adelaide, a first class Honours in animal physiology from the University of New England, and a PhD from the Faculty of Veterinary Science at the University of Sydney. From an early research career focussed on the biology and behaviour of mammals, increasingly her work has involved the broader multi-disciplinary aspects of environmental management and conservation.

Sarah Doornbos is a researcher at the Future of Australia’s Threatened Ecosystems (FATE) Program, now in the Faculty of Agriculture, Food and Natural Resources at the University of Sydney (previously at University of New South Wales). She holds a BSc and MSc degree in Biology from the University of Amsterdam, The Netherlands. With the FATE Program she is involved in interdisciplinary research projects focusing on conservation through sustainable use of native species.

Stephen Jackson is a behavioural and environmental ecologist who has studied Australian mammals in the wild and in captivity over the last 20 years. He has worked in a number of different roles including field ecologist, zookeeper, curator, government regulator, and part time lecturer and wildlife consultant. He has published various scientific articles and three books as a result of his research, with several other books nearing completion. One of his books, Australian Mammals: Biology and Captive Management, was awarded the Whitley Medal for the best natural history book in 2004 from the Royal Zoological Society of New South Wales. Dr Jackson holds a BSc in Botany and Zoology, an MSc in Environmental Biology and a PhD in Zoology.

Project team

Dr Rosie Cooney (Chief Investigator)
Dr Rosalie Chapple (Chief Investigator)
Ms Sarah Doornbos (Researcher)
Ms Kaniknun Bua Chinachatmongkol (Researcher - literature review)
Ms Sue Stevens (Project administration and final report editing)
Mr Peter Ampt (Project Liaison)
Dr Stephen Jackson (Expert Advisor)
Dr George Wilson (Expert Advisor)
Dr Carolyn Larcombe (Expert Advisor)

Project steering committee

Dr Ian McCausland (Chair)
Mr Peter Gowland
Dr Hank Jenkins
Acknowledgments

We greatly appreciate the input we have received from George Wilson and Carolyn Larcombe of the project’s Advisory Group, and from Ian McCausland, Peter Gowland and Hank Jenkins of the Steering Committee. Thank you to Peter Ampt, Manager of the Future of Australia’s Threatened Ecosystems Program (FATE), for his project liaison, and Sue Stevens, also of the FATE program, for her valuable assistance. We are grateful for the generous time donated by volunteers, both Laure Marichal, a graduate student, for her research on media coverage, and Jane Daish, for proofreading, and the work of graduate student Bua Chinachaimongkol for her literature review on native pets. The authors greatly appreciate the time and input of all the individuals who were consulted throughout this study, who are listed in Appendix A. All errors and omissions remain, of course, entirely our own.

Abbreviations

AANAS  Australian Alliance for Native Animal Survival
ACT   Australian Capital Territory
ABA   Associated Bird Keepers of Australia
ASMP  Australasian Species Management Program
ARAZPA Australasian Regional Association of Zoological Parks and Aquaria
AVA   Australian Veterinary Association
BAC   Bawinanga Aboriginal Corporation
CBSG  Conservation Breeding Specialist Group
DAFF  Department of Agriculture, Fisheries and Forestry (Commonwealth)
DECCW Department of Environment, Climate Change and Water (NSW)
DEWHA Department of Environment, Water, Heritage and the Arts (Commonwealth)
DSE   Department of Sustainability and Environment (Victoria)
EPBC  Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
ISIS  International Species Information System
LRS   Levies Revenue Service
NSW   New South Wales
NAKCC National Animal Keepers Consultative Committee
NCCAW National Consultative Committee on Animal Welfare
NT    Northern Territory
NWC   NSW Wildlife Council
PIAA  Pet Industry Association of Australia
RSPCA Royal Society for the Prevention of Cruelty to Animals
SA    South Australia
SPARKS Single Population Analysis & Records Keeping System
WA    Western Australia
WIRENS NSW Wildlife Information Rescue and Education Service Inc (NSW)
WPTAC Wildlife Possession and Trade Advisory Committee (Victoria)
# Contents

Foreword ............................................................................................................................................... iii

About the Authors ................................................................................................................................ iv

Acknowledgments .................................................................................................................................. v

Abbreviations ......................................................................................................................................... v

Executive Summary.............................................................................................................................. ix

1 Introduction ..................................................................................................................................... 1

1.1 Rationale and context for the proposal .................................................................................... 1

1.2 Terms of reference ................................................................................................................... 2

1.3 Approach and outline .............................................................................................................. 2

1.4 Methodology ............................................................................................................................ 2

1.5 What is “pet-keeping”? ............................................................................................................ 2

1.6 Introduction to focal species .................................................................................................... 2

1.7 The social context: stakeholder perspectives on native pets ................................................... 5

2 Arguments for and against a native pet industry: a review ........................................................ 7

2.1 Arguments in favour of keeping native pets ............................................................................ 8

2.2 Arguments against keeping native pets ................................................................................. 11

2.3 Focal species .......................................................................................................................... 17

2.4 Summary ................................................................................................................................ 20

2.5 Conclusion ............................................................................................................................. 21

3 Regulation of keeping, breeding and trade of native fauna as pets .......................................... 22

3.1 Introduction ........................................................................................................................... 22

3.2 Overview of regulation and licensing across jurisdictions .................................................... 23

3.3 Import and export .................................................................................................................. 28

3.4 Companion animal legislation ............................................................................................... 28

3.5 Captive breeding for conservation ......................................................................................... 29

3.6 Issues and implications for focal species ............................................................................... 29

3.7 Summary ................................................................................................................................ 30

3.8 Conclusion ............................................................................................................................. 30

4 Industry feasibility: biological, social, regulatory and economic factors ................................. 31

4.1 Suitability of focal species ..................................................................................................... 31

4.2 Making the industry work for conservation and animal welfare ......................................... 38

4.3 Addressing industry practicalities ............................................................................................ 45

4.4 Conclusions and recommended regulatory and operating models .................................... 53

5 Conclusions and Recommendations ............................................................................................ 58
Tables

Table 3.1 Licensing requirements in the states and territories for the private and commercial keeping, breeding and trade of native birds, reptiles and amphibians ............................. 24
Table 3.2 Licensing requirements in the states and territories for private and commercial keeping, breeding and trade of native mammals as pets ...................................... 25
Table 3.3 Licensing requirements in states and territories for private and commercial keeping, breeding and trade of Mitchell’s hopping mouse and eastern quoll ............................. 25
Table 4.1 Eastern quoll reproduction and development.......................................................... 35
Table 4.2 Mitchell’s hopping mouse reproduction and development.............................................. 37
Table 4.3 Comparison of potential conservation/welfare actions associated with keeping eastern quolls and Mitchell’s hopping mice as pets, and the risks/benefits they address ........... 39
Table 4.4 Number of licences/permits for the keeping of native animals in Australia in 2005 ...... 46
Table 4.5 Number of native birds, mammals, reptiles and amphibians kept under private keepers licences (Basic and Advanced) in SA and Victoria in 2009 .......................... 46
Table 4.6 Number of native mammals kept under private keepers licences (Basic and Advanced) in SA and Victoria in 2009 ................................................................. 47
Table 4.7 Expenditure on pet care in Australia, 2005 ($ million).................................................... 48
Table 4.8a Retail price of native mammal species kept as pets.................................................. 49
Table 4.8b Retail price of Mitchell’s hopping mouse (Victoria) ................................................... 49
Table 4.8c Retail price of spinifex hopping mouse (NSW) ......................................................... 49
Table B1 Major relevant legislation in each state/territory ....................................................... 63
Table B2 Major relevant policies and codes of practice in each state/territory ............................... 64
Table C1 Number of native bird, reptile, frog and mammal species that can be held privately in captivity and their licensing requirements................................................. 65
Table C2 Number of native animals that may be kept under private licence in Victoria .......... 67
Table C3 New mammal listings in Victoria 2009 - summary of the changes requested by WPTAC and DSE’s response to each change .......................................................... 68
Table C4 Number of native animals that can be kept or sold under a Permit in South Australia .. 69
Table C5 Number of native mammal species especially Mitchell’s hopping mouse and eastern quoll, that can be kept as pets under certain conditions in different states and territories................................................................. 72
Table C6 Number of native mammals species especially Mitchell’s hopping mouse and eastern quoll that can be traded as pets under certain conditions in different states and territories ....................................................................................... 77
Table D1 Australian native mammal species that can be kept, bred and traded privately in each jurisdiction and licensing requirements. B= basic licence, A= advanced licence, E= exempt, U= unprotected, blank= cannot be kept ........................................ 78
Table D2 Native mammal species that can be kept, bred and traded commercially in each jurisdiction and licensing requirements. B= basic licence, A= advanced licence, E= exempt, U= unprotected, blank= cannot be kept ........................................................................ 78
Executive Summary

What the report is about
This study focuses on the feasibility of an industry based on keeping native animals as pets, focussing on the marsupial eastern quoll *Dasyurus viverrinus* and the rodent Mitchell’s hopping mouse *Notomys mitchelli* as case studies. It critically examines arguments about the likely impact of such an industry on conservation and animal welfare, surveys current regulatory approaches, assesses the suitability of the focal species for keeping, and examines a range of critical issues for conservation, welfare, regulation and industry structure. It develops a set of recommended models that could be applied for the regulation and operation of an industry based on keeping of the focal species.

At whom is the report targeted?
The report is targeted at all those with a stake in the debate over the keeping of native animals as pets, including in particular, environment and pet industry regulators at state and territory level, the established pet industry, conservationists, wildlife breeders and sanctuary operators, advocates and organisations supporting animal welfare and animal rights, veterinarians and veterinary bodies, animal rescue and rehabilitation groups, and Aboriginal groups concerned with the management and care of native animals.

Background
While the keeping of native reptiles, birds and amphibians as pets is reasonably established across Australia, the use of most native mammals as domestic pets is currently prohibited in most states. In recent years it has been proposed that keeping native mammals as pets could contribute in a variety of ways to their conservation. These proposals are motivated primarily by threats to the survival in the wild of many mammal species, and the widespread keeping as pets of exotic predators that may have detrimental impacts on native wildlife. However, use of native mammals as pets is controversial on a number of grounds, including whether conservation of these species would be served by such an approach, the consequences for animal welfare, and whether such an industry would be practical from an economic or regulatory standpoint. Despite a level of media debate, there has been very little detailed examination of these aspects. This study seeks to strategically inform the potential development of an industry based on use of native mammals as pets in a way that helps to ensure positive conservation and welfare outcomes.

*ACT native mammal keeper with spinifex hopping mice. Courtesy Fred Ford.*
**Objectives and methodology**

The objectives of this study are to examine the feasibility of a native animal pet industry, based on the captive breeding of two reproductively diverse native mammals, the marsupial eastern quoll *Dasyurus viverrinus* and the rodent Mitchell’s hopping mouse *Notomys mitchelli*, and to make recommendations on the major constraints, opportunities, key people and issues to be considered in the development of a pet industry based on these native mammals. This study was carried out primarily by desk research, including academic and popular literature, legislation, and a wide range of government and industry documents and reports. This research was supplemented by extensive consultation with stakeholders.

**Key findings**

**Conservation and animal welfare arguments for and against native pets**

1. Domestic and feral cats are invasive pests that are a significant threat to small native mammals, and native pets could potentially replace some of these exotic predators as pets. While any such replacement is likely to be at a very small scale, especially in the near future, native mammals including eastern quolls and Mitchell’s hopping mice could be particularly important in providing a viable alternative pet in areas of ecological sensitivity, either voluntarily or in support of local restrictions on cat and/or dog ownership.

2. Breeding and maintaining native species for keeping as pets could potentially contribute to the maintenance, security and genetic health of populations, and provide a captive source for reintroductions. For eastern quolls, with only a single breeding captive population and the remaining Tasmanian population vulnerable to fox predation, this could be an important conservation benefit. For Mitchell’s hopping mouse, of lower conservation priority, this is less important, although a captive breeding stock could provide animals for reintroductions where biodiversity rehabilitation is the objective. However, for threatened species in particular this would require careful genetic management of the breeding stock to maintain wild-type genetics, avoiding the selective breeding for unusual or exaggerated characteristics that often takes place when species are bred for the pet market.

3. Private animal keepers often make significant contributions to understanding of the husbandry and biology of the species kept. More widespread native pet keeping, including of the focal species, could contribute to conservation through increasing the relevant knowledge base, as long as information accrued through private breeding and keeping was appropriately published or disseminated to make it available to conservation managers.

4. Funds to support relevant conservation, research or education programs could be generated through a government levy exacted on the native pet industry, similarly to levies currently in place for a number of Australian industries, which is returned to conservation or research projects. Further, it is possible that a native pet industry could provide a source of revenue for conservation-oriented organisations involved in captive breeding of the species involved, allowing them to raise revenue for conservation projects by selling a proportion of offspring bred or offspring of particular species. If captive breeding became economically attractive through an expanded native mammal pet industry, this could drive investments in captive breeding that under some conditions could benefit conservation. These mechanisms could potentially operate in the case of eastern quolls and Mitchell’s hopping mice.

5. Lack of public awareness of native wildlife, particularly uncommon threatened species, necessarily translates into a lack of motivation to conserve them. Encouraging the connection between people and wildlife is widely recognised as a critical element in increasing public interest in and concern for wildlife, which can have a range of outcomes that support their conservation. Awareness of eastern quolls and Mitchell’s hopping mice is low in the general public and their widespread keeping could potentially sensitise people to the existence and needs of native wildlife.

6. The welfare of native mammals kept as pets could be poor. The risk here is species-specific, and will depend on the needs of the particular species for suitable housing and stimulation, health care, diet and social life, and their vulnerability to stress, disease, and attacks by dogs and cats.
7. Keeping of native mammals as pets carries a risk of accidental or deliberate release of these animals. Such releases are in general unlikely to establish self-sustaining populations, but carry the risk of impacting on local native biodiversity through competition for resources with locally native species; disease transmission; and escaped or released pets disrupting wild gene pools of the same or other species through inter-breeding with wild populations. A particular genetic impact on wild populations could arise where captive populations bred for pets have been the subject of directional selection for particular “unnatural” or unusual characteristics such as body size or colour, or for “domestic” attributes such as docility, ease of handling, and lack of fear of humans. For eastern quolls, the lack of any wild population means that on the mainland most of these risks are negligible. In view of its conservation status, however, maintaining wild-type genetics is extremely important for this species. For Mitchell’s hopping mouse, any habitat suitable for colonisation is likely to be within its historic native range, meaning establishment of feral populations is unlikely to be problematic. While the potential for interbreeding with other Notomys species exists this is unlikely to be of any conservation significance. Neither species is known to carry diseases in captivity that could pose threats to wild populations.

8. Poaching from wild populations could be stimulated by increasing demand for native mammals as pets. However, if animals are more readily and cheaply available from captive bred sources this will reduce incentives for traders to purchase illegally sourced animals and reduce the incentive to poach. It may also be that many mammals will require hand-rearing in order to make suitable pets, decreasing the returns from poaching. For quolls, poachers would need to access remaining wild populations in Tasmania, which might mean poaching was unlikely to be economic. No reports of illegal harvest or trade of Mitchell’s hopping mouse have been found, despite it being legally kept in several states. However, poaching and illegal domestic and international trade remain a substantive potential risk.

Current regulation

9. Regulation of the keeping of native pets in Australia is carried out by states/territories. It is complex and varies significantly from state to state.

10. All jurisdictions allow some native animals (including mammals) to be kept as pets, and regulate keeping through licensing/permitting systems. In each jurisdiction some native species are exempt, while others can be kept under licence. In some jurisdictions there are different licence categories for species requiring more experience/expertise.

11. Keeping of native mammals, is in most jurisdictions, more tightly restricted than keeping of native reptiles and birds.

12. States vary widely in terms of permissiveness of native mammal keeping, from allowing all mammals to be kept (NT, SA) to none (Queensland, WA, ACT).

13. Changes required that allow eastern quoll and Mitchell’s hopping mouse to be kept as pets depend on the jurisdiction. In some states/territories this would require changes to legislative schedules, while in others only a change in policy and practice would be required. Most states have a consultative apparatus in place to channel advice regarding policy changes to the relevant department.

Species suitability

14. Eastern quolls could potentially be suitable for private keeping, with some reservations. Most keepers are enthusiastic about their experience and report that they are engaging, attractive and interesting to keep, and can be kept with or without specialised enclosures and equipment. No major animal welfare issues appear to be raised by the keeping of eastern quolls, if keepers are well informed, have appropriate expertise, and are motivated to address quolls’ needs for adequate space, appropriate food and behavioural enrichment. While veterinary knowledge is currently inadequate, experience with exotic and native birds and reptiles suggests vets exposed to new species quickly acquire and share knowledge. While aggression and anti-social behaviours (scent-marking, chewing etc) occur to some extent, they appear at worst comparable to cats or dogs, and there would be little basis for restricting their keeping on these grounds.
15. However, there are some caveats. There are issues that could make quolls inappropriate as pets, including their short life span, which may make them unattractive to some keepers, and susceptibility to toxoplasmosis, which would preclude contact with domestic cats. Quolls may need to be hand-reared to make suitable pets, which alongside their slow rate of breeding could have implications for their financial viability. Low reproductive rates also mean that captive breeding colonies may not maintain viability over the long term. Eastern quolls may not be suitable for keeping as “pets” in the traditional sense (see section 1.5). Two of the most experienced eastern quoll breeders remain doubtful about their suitability for keeping by the general public (T. Evans and J. Little (private keepers), pers. comm.), pointing out that knowledge of their husbandry needs is not complete. Quolls may well be more suitable as animals kept under the “animal-keeping” model, with keeping restricted to those who can demonstrate appropriate specialist skills and experience.

16. From an attractiveness, animal welfare and public health perspective Mitchell’s hopping mouse appears highly suitable as a pet. It is easily managed in captivity, where it breeds prolifically with low husbandry costs. Rodents are already widely kept as household pets, and private keepers in Victoria are keeping Mitchell’s hopping mouse successfully.

Potential measures to make the industry work for conservation and animal welfare

17. A range of regulatory, educational, and industry structural measures could be used to address the various conservation and animal welfare threats raised by wider mammal-keeping, and to maximise the potential industry contribution to conservation.

18. A permanent identification (e.g. microchipping), registration and record-keeping scheme for some species would enable keepers to be held accountable for offences relating to animals, including escapes/releases; allows verification of animal origins and therefore assists in controlling illegal harvest/trade, and enables monitoring of keeping and detection of potentially problematic trends.

19. Coordinated, scientifically-based genetic management of captive populations of some species would enable conservation of wild-type genes, maintenance of genetic health (e.g. avoiding inbreeding or outbreeding depression), and avoidance of directional selection in response to commercial pressures (e.g. for unusual characteristics, colour morphs, or docility).

20. Current eastern quoll breeders may be able to sell surplus animals (e.g. males) to raise money for their captive breeding and conservation activities.

21. Breeding of some species could be restricted to licensed breeders who can demonstrate appropriate skills and expertise, with mandatory de-sexing of animals in private keeping. This would ensure that conservation-focused management of captive colonies is not undermined by poorly coordinated or commercially driven breeding, and that all breeding is appropriate to maintain wild-type genetics and genetic health. It would also vastly reduce the potential for escape/releases to impact on wild populations, as individual escapees could not breed with wild populations or establish feral populations.

22. Licensing of keeping can restrict keeping and/or breeding to those who can demonstrate awareness of appropriate husbandry and animal welfare requirements, and can involve different licences (e.g. basic vs specialist) for species requiring different levels of skill and expertise.

23. A conservation levy on breeders/traders or a conservation charge on keepers could raise funding to be returned to appropriate conservation projects.

24. A range of public education and awareness measures could ensure wider native mammal-keeping was accompanied by wider understanding and awareness of native species, the threats facing them in the wild, the need for conservation measures and the ways in which the public can contribute.

25. Development of appropriate codes of practice for keeping native mammals in all jurisdictions that allow their keeping could contribute significantly to ensuring wide understanding of animal welfare and husbandry requirements among keepers.
Industry practicalities

26. Demand for keeping of native animals, including both eastern quoll and Mitchell’s hopping mouse, could be potentially significant.

27. Mammals are greatly under-represented in keeping of native animals, compared to other taxa. Given that in general mammals are, along with birds, the most widely attractive of pets, there is likely to be strong demand among the public for native mammals as pets if appropriate and attractive species were more readily available.

28. For some species, including eastern quoll, sourcing appropriate breeding stock to establish breeding colonies presents a challenge, particularly as ensuring sound genetic structure is likely to require gaining permission to collect some animals from the wild.

29. The current estimated cost of an eastern quoll is high (approximately $3000), which will restrict its popularity for keeping, at least until the market price goes down with increasing availability.

30. Retailing animals direct from breeders to consumers is more likely to deliver good animal welfare outcomes than sale through pet stores, although there is an important potential role of pet shops in supporting good husbandry through providing equipment and supplies.

31. Public advertising by commercial breeders and retailers is problematic because it risks exciting interest in keeping animals among those who are unsuitable (i.e. who have not properly considered the needs of the animal and their ability to meet them). However, there is a distinction to be drawn between advertising and educational material.

32. Educational material addressing the conservation status of quolls, the option of keeping them, and details on husbandry could be provided by pet shops and other outlets.

33. The current regulatory apparatus is not well designed to regulate an industry with conservation as a primary outcome.

34. Public attitudes vary widely, with some being firmly opposed to the keeping of native animals, and this could pose obstacles to broader public acceptance.

Conclusions and Recommendations

Overall feasibility

1. Establishing a limited industry based on the expansion of keeping of a range of native mammals appears feasible, and could potentially deliver benefits for conservation without excessive conservation or animal welfare risks. However, this is only likely if the industry is carefully structured and regulated (and not over-regulated), and only with respect to certain species.

Current regulation

2. Private keeping of native mammals as pets is tightly restricted in most jurisdictions in Australia, much more so than keeping of native reptiles and birds. Expanding keeping of native mammals would require legislative or policy change in most states and territories.

Species suitability

3. Eastern quolls are potentially suitable for private keeping, although possibly not as traditional “pets”. As long as keepers are well educated and have appropriate skills, no major welfare or husbandry issues are identified. However, eastern quolls’ susceptibility to toxoplasmosis, relatively short lifespan, low reproductive rate and potentially high cost may raise issues around market demand and financial viability. Their keeping raises potential conservation issues that appear manageable through appropriate regulatory and operating structures.

4. Mitchell’s hopping mouse is a suitable species for widespread keeping as a pet.
Making the industry work for conservation and animal welfare

5. There is a range of potential conservation benefits that could be gained by establishing and expanding the range and extent of keeping of native mammals, particularly where these would replace introduced predators as pets, and there are a number of negative side-effects that such a development could potentially entail, for native wildlife (in the wild) and for the welfare of the species kept.

6. A range of regulatory, educational, and industry structure measures could be used to address the various conservation and animal welfare threats raised by wider mammal-keeping, and to maximise the potential industry contribution to conservation.

Industry practicalities

7. Establishment of an industry based on native pets would face a number of likely challenges including supply of animals, regulation, and potential opposition, but would benefit from strong likely demand. Retail models involving sale of native animals directly from breeders to consumers (rather than through pet stores), and accompanied by educational material, are advisable for certain species to promote good animal welfare outcomes.

Regulatory and operating models

8. For the eastern quoll, and potentially for other species of high conservation concern, a model of regulation and industry operation is adopted that has the following features (as elaborated in Chapter 4):
   - All breeding is managed within a single coordinated, scientifically-based conservation framework that ensures conservation of wild-type genes, maintenance of genetic health (e.g. avoiding inbreeding or outbreeding depression), and avoidance of directional selection in response to commercial pressures (e.g. for unusual characteristics, colour morphs, or docility).
   - Breeding is carried out by a limited number of reputable institutions with appropriate expertise, to ensure conservation and welfare standards are upheld.
   - There is mandatory de-sexing of animals kept by private keepers, to ensure that conservation-focused management of captive colonies is not undermined by poorly coordinated or commercially driven breeding, and that all breeding is appropriate to maintain wild-type genetics and genetic health. This would also vastly reduce the potential for escape/releases to impact on wild populations, as individual escapees could not breed with wild populations or establish feral populations.
   - A specialist keeper’s licence is required for private keeping, which requires demonstration of appropriate knowledge and expertise.
   - Current eastern quoll breeders may be able to sell surplus animals (e.g. males) to raise money for their captive breeding and conservation activities.
   - A compulsory scheme of permanent identification, registration and record-keeping is established. This would enable keepers to be held accountable for offences relating to animals, including escapes/releases; allow verification of animal origins and therefore assist in controlling illegal harvest/trade, and enable monitoring of keeping and detection of potentially problematic trends.
   - Animals can only be bought directly from registered breeders, and are not displayed in or sold by pet stores, to reduce animal welfare impacts of transport and display, minimise risks of disease outbreaks, and avoid impulse buying.
   - There is no advertising of the pets through general printed or electronic media, to reduce the risk of impulse buying.
   - A conservation levy is charged at point of sale, which is used to support conservation projects.
1. A code of practice for keeping of native mammals is developed and applied, with adherence being a licence condition for all keepers and breeders, to promote high animal welfare standards.

2. An initial pilot study is carried out in one state to enable information gathering and better risk assessment.

9. For the Mitchell’s hopping mouse, and potentially for other species of lesser conservation concern, a model of regulation and industry operation is adopted that has the following features, (as elaborated in Chapter 4):
   - Animals may be kept and bred with a basic keeper’s licence, and must submit records specifying births, deaths, and exchanges.
   - Commercial breeding requires a separate commercial breeder’s licence, which requires demonstration of appropriate expertise and facilities.
   - Animals may be sold by commercial breeders, by keepers, or by pet stores.
   - For specified pet shops that take responsibility for supporting responsible keeping of native mammals, pet shop staff are trained in the husbandry requirements of the species, and are required to provide comprehensive information on animal welfare and husbandry to buyers.
   - A code of practice for keeping of native mammals is developed and applied, with adherence being a licence condition for all keepers and breeders, to promote high animal welfare standards.
   - A conservation levy is charged at point of sale from commercial breeders, which is returned to support conservation of native wildlife and their habitats.
1 Introduction

1.1 Rationale and context for the proposal

Australia’s biodiversity faces a range of significant threats, the most serious of which include habitat loss and degradation, and the impact of invasive species (plants, animals, and diseases) (Lindenmayer 2007; Cork et al. 2006). Australia has the worst record of mammal extinctions in the world, with 20 mammals becoming extinct since European settlement (Lindenmayer 2007). Efforts to conserve them have met with limited success (Pressey and Bottrill 2008; Morton et al. 2009). Mainstream conservation responses emphasise setting aside protected areas for conservation and regulating damaging activities, yet despite ongoing efforts put into this traditional “fences and fines” approach, Australian biodiversity remains unambiguously in decline.

In situ conservation of wildlife is always the preferable conservation strategy, but for many of Australia’s native mammals, in situ conservation alone is clearly failing. Decisions about alternative strategies are difficult. Use of and trade in wildlife has often been discussed and used as a tool for conservation (e.g. Hutton and Leader-Williams 2003; Rosser, Leader-Williams and Tareen 2005; Lindsey et al. 2007), with rare but notable examples in Australia (e.g. Webb and Manolis 1993). Use of wildlife at sustainable levels can be either detrimental or beneficial to wildlife, and a key area of interest for researchers and practitioners is under what conditions use leads to good conservation outcomes. Indeed, the question “Under what conditions is trade in captive or wild-harvested species beneficial for wild populations of the traded species?” was identified as among the 100 most important questions for the future of conservation practice and policy (Sutherland et al. 2009). In recent years a number of academic and popular authors have proposed the sustainable use of Australian native mammals as pets as a means to contribute to conservation of these species (Archer 2000; Hopwood 2002; Archer and Beale 2004). The idea of establishing a native mammal pet industry has been controversial on a number of grounds, including whether conservation would be served by such an approach, the consequences for animal welfare and rights, and whether such an industry would be practical from an economic or regulatory standpoint. However, to date the debate about the trade and keeping of native animals as pets has often involved rather polemic statements, and has rarely been informed by detailed examination of the likely impacts and feasibility of such an approach, including under realistic scenarios of regulation and industry structure. This study seeks to fill this gap.

1.2 Terms of reference

The terms of reference for this study, defined by a RIRDC Steering Committee, are to examine the feasibility of a native animal pet industry, based on the captive breeding of two reproductively diverse native mammals, the marsupial eastern quoll *Dasyurus viverrinus* and the rodent Mitchell’s hopping mouse *Notomys mitchelli*, and to make recommendations on the major constraints, opportunities, key people and issues to be considered in the development of a pet industry based on these native mammals.

The study should include:

- an assessment of current state and Federal legislation and opportunities for change to accommodate this proposal
- an evaluation of literature for and against a native pet industry, with an assessment of the merits and disadvantages of eastern quolls and Mitchell’s hopping mouse in terms of their suitability as pets, the risk of them becoming a pest if they escape, and the potential effects of interbreeding of captive bred and wild individuals
- a general assessment of the likely public attitude towards the proposal and the likely demand for these mammals, given that they prove to be suitable as domestic pets
- an assessment of the practicability of a pet industry based on the eastern quoll and Mitchell’s hopping mouse including any additional research needed into breeding, feeding and husbandry,
the likely constraints to profitability and structure of industry, including distribution arrangements, permanent identification and registration requirements

- a determination of how the integrity of the wild genes could be permanently assured.

1.3 Approach and outline

Assessment of the feasibility of developing an industry based on the use of native mammals as pets requires addressing a range of environmental, regulatory, economic and social dimensions. This study begins by setting out the methodology employed and providing background on the characteristics of the focal species and the social context (below). This is followed by a summary and assessment of the various arguments for and against the use of native animals as pets, from the perspectives of conservation and animal welfare (Chapter 2). The next chapter analyses and summarises current regulation of the keeping of native animals, particularly mammals, in Australia, highlighting the changes that would be required in order to enable more widespread keeping (Chapter 3). In Chapter 4, options for the regulation and industry structure of a potential native mammal pet industry based on the two focal species are explored, addressing inter alia the conservation and welfare issues raised in Chapter 2. Finally, Chapter 5 sets out our conclusions and recommendations on the feasibility of an industry based on for an evaluation of the viability and appropriateness of an industry based on the eastern quoll and Mitchell’s hopping mouse as pets (Ch 4) and recommends how the commercial sale of the two species might operate, and the conditions likely to be required to ensure conservation benefits along with financial viability.

1.4 Methodology

This work was carried out primarily by desk research, including academic and popular literature, legislation, and a wide range of government and industry documents and reports. This research was supplemented by consultation (see Appendix A1) with relevant stakeholders from the key groups outlined below in Section 1.7.

1.5 What is “pet-keeping”?

Clarification of what is encompassed under the rubric of pet keeping is useful at this point. People keep animals for a variety of reasons. There is a clear distinction between traditional notions of “pet-keeping” for companionship and pleasure (i.e. keeping an animal that may come when it is called, move freely around house and/or garden, jump on its owner’s lap and be petted and stroked) and “animal-keeping” for interest and study (i.e. keeping an animal in conditions seeking to emulate a wild state, which might involve keeping animals enclosed in aviaries or runs and providing specialised habitat requirements). Many species may be suitable for keeping, but not in the former sense of a traditional pet. For instance, husbandry requirements are more likely to be met in the latter case, as keepers are presumed to be keen and motivated to learn about the species. Currently, keeping of native mammals most commonly falls into the “animal keeping” category rather than the traditional “pet” category. However for the sake of brevity, this report uses the term “pets” and “pet keeping” as catch-all terms to encompass the spectrum of private keeping of animals by individuals for reasons such as companionship, enthusiasm, interest, recreation and amateur study. Traditional pets such as cats and dogs have undergone a long history of domestication, and of selective breeding for attributes favourable to being kept by humans, such as docility and ease of handling. Native mammals however have not, and current keeping of native mammals does not generally involve conscious selection for such attributes. Throughout this study, therefore, unless otherwise indicated, discussion of pet keeping does not necessarily imply any process of domestication.

1.6 Introduction to focal species

This section provides a general introduction to the biology, ecology and conservation status of the two focal species, as specified in the project’s Terms of Reference. More detailed aspects of their biology and their suitability for keeping are addressed in subsequent chapters. Appendix A2 shows the location of the focal species within a phylogenetic tree.
1.6.1 Eastern quoll

**General biology**

Eastern quolls are medium-sized dasyurid marsupials. A detailed description of their biology and behaviour is given in Chapter 4. Two distinct colour morphs exist, which may occur in the same litter – fawn with white belly or black with brown belly. Both morphs have white spots on the back and the fawn morph is more common, representing about 75% of the present population (Jones et al. 2003). The eastern quoll differs from other species of quoll with only four toes on the hindfeet, and a plain tail without spots.

Habitat of the eastern quoll encompasses dry forest, grassland, and woodland, tending to avoid dense wet forest (Menkhorst 1995). In Tasmania, the eastern quoll is found in most habitats including grassland, sedgeland, heathland, alpine habitats, grassy woodland, eucalypt forests and temperate rainforest. They are most abundant in the drier eastern half of Tasmania and prefer open habitats, where the highest population densities occur on grasslands or where farmland is adjacent to eucalypt forest (Jones and Rose 2001).

Eastern quolls are primarily carnivorous. Their diet includes small mammals such as mice, rabbits and bandicoots; reptiles; ground-nesting birds; insects and fruits. They also opportunistically scavenge on the carcasses of large animals.

**Distribution and conservation status**

Quolls are mainland Australia’s largest surviving marsupial carnivore. There are four species of quoll found in Australia - the eastern quoll, the northern quoll *Dasyurus hallucatus*, the western quoll *D. geoffroii*, and the spotted-tailed quoll *D. maculatus*. The latter three species are listed as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999.

The eastern quoll is not nationally listed as threatened. However, it is listed as ‘near threatened’ in the IUCN Red List (McKnight 2008), and under state legislation, as ‘endangered’ in New South Wales.
(NSW) and South Australia (SA) and as ‘threatened’ in Victoria. The eastern quoll remains common in the wild in Tasmania. Its former distribution on the mainland was along the eastern coastline from southeast SA to NSW, and is now presumed extinct on the mainland with the last confirmed sighting being in Sydney in 1963 (Jones and Rose 2001). There have, however, been recent sightings in Victoria (Museum Victoria 2008) resulting from the release of eastern quolls from Mt Rothwell sanctuary (T. Evans, pers. comm.), and anecdotal reports of sightings in northern NSW (Rehberg 2008).

Factors causing the dramatic decline of the eastern quoll on the mainland are likely to be habitat destruction, predation and competition by introduced foxes and cats, and an outbreak from disease of unknown cause in the 1900s (Department of the Environment, Water, Heritage and the Arts 2004). While the remaining population of eastern quoll in Tasmania is still relatively common, there is a significant threat to the future of this population because of the recent introduction of red fox *Vulpes vulpes* in Tasmania (Department of Environment, Parks, Heritage and the Arts 2009). Unlike the other three (Commonwealth-listed) quoll species, there is no Commonwealth recovery plan for the eastern quoll. Similarly, there are no state recovery plans in place.

1.6.2 Mitchell’s hopping mouse

**General biology**

Hopping mice (*Notomys* spp.) are among the most distinctive and well-known of Australian native rodents. They are distinguished by their greatly elongated hind-legs, hopping gait, large eyes and long tufted tails. Current belief is that there are ten species of hopping mice, only five of which are known to still be distributed throughout the desert and semi-desert areas of Australia (Watts and Aslin 1981). Mitchell’s hopping mice are the largest of the *Notomys* species existing today. The fur is fawn to dark grey on the back and white from the throat to the chest. The ears are long and oval-shaped. They usually move on all four feet but hop to move faster. Their morphology is a likely adaptation to aridity and life in the desert (Watts 1981).

Mitchell’s hopping mice are nocturnal and commonly live within sand dunes and create complex deep burrow systems where they nest and raise their young (Watts 1981). They burrow during the day to avoid predators and extreme environmental conditions. Nests are made out of leaves and other plant material (Watts 1981). They live in colonies of up to eight adults per burrow. Gland secretions on the neck and chest are important for the social system to mark home ranges and members of the same colonies. Habitat ranges from desert to wet areas, although they prefer drier zone areas covered with eucalypts, tall scrub, and shrubby understorey. The most important habitat requirement is the presence of shrubs to ensure the source of seeds for their diet, which includes fruits, flowers, stems, leaves, and insects (Cronin 1991). These details are addressed further in Chapter 4.

**Distribution and conservation status**

Mitchell’s hopping mice occur in the mallee regions of southern Australia, including Victoria, SA and Western Australia (WA), although their range is thought to have contracted since European settlement (Breed & Ford 2007).

They are not listed as threatened under Commonwealth legislation or in SA, Victoria or WA, and in NSW (on the edge of their former range) they are classified as ‘presumed extinct’. They are classified as ‘least concern’ in the IUCN Red List (Morris et al. 2008). The current distribution of Mitchell’s hopping mice is patchy and dependent on fragmented vegetative remnants (Breed & Ford 2007). Causes of decline include land clearing for agriculture, predation from introduced species, loss of vegetation through grazing from livestock, and changing fire regimes (Dickman et al. 2000; Seebeck and Menkhorst 2000; Morris et al. 2008).
1.7 The social context: stakeholder perspectives on native pets

This section outlines the diverse range of values, perspectives and beliefs held by key participants in the debate over keeping native mammals as pets. This is a value-laden debate in which strongly held values may frequently prevail over science, and it is therefore useful to map out the social context. While many of these stakeholders share common values, such as concern for the care and conservation of native species, the focus of their concerns varies widely depending on their situation (or what they identify with).

1.7.1 Government legislative and regulatory agencies

Government agencies are generally concerned that the keeping of native animals as pets is well regulated, and that they (the agencies) are adequately resourced to monitor compliance with regulations. Regulators in government agencies are often concerned about an increase in keeping of native animals as pets as this will increase administrative load, including managing compliance and licensing.

1.7.2 Pet industry

This industry is based on keeping of domestic pets such as cats and dogs, primarily within traditional notions of “pet-keeping” for companionship and pleasure. The peak body representing the entire range of businesses involved in the pet industry in Australia is the Pet Industry Association of Australia (PIAA). The Pet Industry Association is self-funded, promotes self-regulation and their aims include raising the standard for all Australian pet industry businesses. They “believe that owning pets is good for your health and good for society” and this view extends to native pets1.

1.7.3 Animal welfare

The animal welfare movement works to prevent cruelty to animals by actively promoting their care and protection. The widely recognised peak non-government body representing animal welfare in Australia is the Royal Society for the Prevention of Cruelty to Animals (RSPCA). RSPCA Australia is opposed to the keeping of native animals as pets or companions on the basis of difficulty in adequately providing for their needs.

1.7.4 Animal protection movement (animal rights and animal liberation)

The animal protection movement focuses on the ethical or ideological basis of pet-keeping as distinct from consequent animal welfare. Animal protectionists posit that wild animals intrinsically belong in the wild, not in our homes or backyards. The work of animal rights groups is based on the belief that all life has the right to exist in its natural state, and that humans have no right to disrupt, affect, or harm animals in order to meet society’s needs, values or desires. Leaders in the animal rights movement include the non-government organisations Animal Liberation Australia and Animals Australia.

1.7.5 Conservationists and ecologists

The identity of this group is primarily with the sustainable conservation of biodiversity and the natural environment, and as such they engage with the issue of keeping native animals as pets from a range of perspectives in terms of its potential impacts on native species conservation.

---

1 www.piaa.net.au/index.php?option=com_content&view=article&id=19&Itemid=40
1.7.6 Native mammal breeders, carers and keepers

This group includes wildlife sanctuaries and enthusiast native animal-keepers (as distinct from traditional domestic pet-keepers), and they have varied perspectives on keeping native mammals as pets. For example, the Marsupial Society of Australia actively encourages the keeping and breeding of marsupials in captivity but generally not as traditional ‘pets’. WIRES, the NSW Wildlife Information Rescue and Education Service Inc, is a network of wildlife carers and rescuers dedicated to the rehabilitation of native animals and the issue of keeping native animals as pets is quite controversial with many members2.

1.7.7 Aboriginal people

A major concern held by Aboriginal people, whose perspectives on keeping native mammals as pets vary, is the lack of consultation with them in making decisions about the use of native animals on their land. The Australian Alliance for Native Animal Survival (AANAS) Inc has been recently established to address this need for consultation. Many Aboriginal people are concerned that their relationship with native animals should inform how these species are kept and used - native Australian animals are unique in the world, and Aboriginal culture evolved with these animals and therefore carries an inherent knowledge and concern for the needs and care of these species.

1.7.8 Veterinarians

The identity of veterinarians is primarily with animal health, welfare and wellbeing. As the key representative body of vets in Australia, the Australian Veterinary Association (AVA) policy supports the keeping of native animals as pets by private individuals only where it is legally permitted. AVA membership is broad, with a diversity of opinions on the subject of keeping native animals as pets.

2 LiveWIRES newsletter Summer 1999 p.1
2 Arguments for and against a native pet industry: a review

This chapter outlines and assesses major arguments for and against the keeping of native animals as pets from the point of view of conservation and of animal welfare. Arguments are discussed in general, then applied to the two focal species, drawing from experience and perspectives in Australia and overseas. While the focus of this study is on mammals, most of the arguments are relevant to native species in general, so examples and evidence are drawn from a wide variety of taxa.

The key arguments for keeping native mammals as pets can be summarised as follows:
- reducing the keeping of exotic species as pets
- safeguarding and expanding populations of species that are threatened in the wild
- increasing knowledge of native animal husbandry and ecology
- generating resources for conservation of species
- increasing public awareness of the existence and needs of native wildlife.

The key arguments against can be summarised as:
- risking cruelty through failure to care for welfare of animals
- removal of animal right to freedom
- impacting wild populations through escape or release
- illegal harvesting of animals from the wild.

These arguments are discussed below in turn.
2.1 Arguments in favour of keeping native pets

2.1.1 Reducing the keeping of exotic species as pets

The simplest conservation rationale for opening up the option of keeping native mammals as pets is that they may displace current exotic (i.e. non-native) mammalian pets. This would avoid contributing to the serious wildlife impacts of exotic pets such as cats and dogs - feral cats in particular are highly destructive invasive pests, and domestic pets readily and regularly become feral.

A number of surveys of the prey of domestic cats indicate that they predate a wide range of native wildlife including small mammals, birds, reptiles and amphibians, and that these impacts on native fauna are likely to be substantial (Dickman 1996). For example, a study by Barratt (1997) surveyed the catches of 214 pet cats over a one year period in the suburbs of Canberra, and suggests predation by house cats may have a substantial impact on locally-abundant, patchily-distributed populations of native fauna, particularly mammals. Monthly catches by monitored cats were always over 120 animals/month and up to over 250 animals/month. Native wildlife taken included 73 bird species, 14 mammal species, 131 reptile species, and 22 amphibian species, with the take of native species being higher when cats lived closer to semi-natural areas of rural or grassland habitat.

Recent modelling has shown that where fear of pet cats on the part of wildlife depresses their reproductive success, the impacts of cats can be much more significant than the direct impacts of predation only (Beckerman et al. 2007). Further, recent work indicates that dog walking can have significant negative impacts on native species, with Banks and Bryant (2007) showing that dog walking caused highly significant reductions of numbers of birds and species richness in woodland on the outskirts of Sydney.

Predation of native species by domestic cats that have gone feral has been listed by the Commonwealth as a key threatening process under the Environment Protection Biodiversity Conservation Act due to their impacts on native fauna, the most important being direct predation (Dickman 1996). Cats prey upon native mammals up to the size of 2000g, and especially those weighing less than 220g (Dickman 1996). In urban, suburban and temperate forest habitats, marsupials (including antechinus, possums and gliders) comprise the majority of the diet of feral cats. Feral cats may also compete with some species of native predators, such as with quolls and owls for prey (Pascoe 2009) and for habitat/den requirements, and spread diseases to which native fauna are highly susceptible (Dickman 1996). Cats are the principle vector of toxoplasmosis, which (apart from its serious human health impacts) they communicate to wildlife including marsupials which commonly die once infected (e.g. Jackson 2003, Vogelnest and Woods 2008).

People who currently keep cats and dogs (and rabbits and guinea pigs) are probably more likely to be attracted to other mammals than they are to birds and reptiles. This means that while a wide range of native birds and reptiles can currently be kept, these species are unlikely to have the same allure for mammal keepers as native mammals. Expanding options for native mammal keeping may therefore result in a substantial proportion of potential keepers avoiding exotic predators in favour of native mammals. Keeping native mammals could be particularly appropriate in ecologically sensitive areas of housing, such as neighbouring protected bushland, and policies that restrict keeping of exotic pets in these areas could be developed. There are examples of councils restricting or prohibiting cat ownership in sensitive areas (see e.g. Pittwater Council, undated), and communities voluntarily restricting cat and dog ownership to protect native wildlife. In such communities, native mammals could be appropriate pets to take the place of problematic introduced predators. It is possible the availability of native mammals could make restrictions on cat ownership (sometimes highly unpopular) more palatable to communities.

An analogy is the recent increase in popularity of native gardens in Australia, preceded by conscious efforts to have gardens based on introduced species. This change has been associated with increasing awareness of native plants and of the impacts of invasive introduced plants. It has been a recent trend
for people to have greater respect for local conditions and water scarcity, and to be interested in planting species native to the region.

2.1.2 Safeguarding and expanding populations of species that are threatened or in decline in the wild

Given that populations of many Australian native species are in decline in the wild, enabling the keeping of threatened native animals as pets could potentially contribute to safeguarding and boosting captive populations or specific gene pools. Simply having more individuals of a threatened species, and/or representing more populations of a threatened species, in a variety of locations is potentially important in maintaining population persistence and genetic diversity. Captive populations bred for the pet industry could also potentially serve as ‘reservoir’ populations to reintroduce species to natural habitats in the future if the primary causes of decline have been addressed (e.g. habitat loss and introduced predators).

In support of this idea, examples exist where populations of native animals kept by private keepers in Australia have maintained the species in the face of extinction in the wild. The rainbow fish *Melanotaenia eachamensis* was found in a detailed survey in 1987 to have completely disappeared from the lake that constituted its sole wild habitat in northern Queensland, apparently due to the introduction to the lake of several Australian non-native fish species (Barlow et al. 1987). However, the species survived in aquaria of a fish keepers’ enthusiasts association. These fish were subsequently used in breeding programs by the Queensland fisheries agency in preparation for reintroduction after the eradication of non-native fishes (Barlow et al. 1987; Low 2002). Likewise, breeding colonies of the Gouldian finch *Erythrura gouldiae* established by a private enthusiast may offer a potentially important safeguard population for this endangered species (Archer and Beale 2004).

However, to contribute to these potential conservation benefits, breeding for the pet industry would need to adhere to a number of conditions. In particular, the wild-type genetics of the species would need to be maintained. Private animal keepers often breed for unusual or exaggerated characteristics, such as the bright blue plumage and large size common in budgerigars, or behavioural attributes attractive to keepers, such as docility and ease of handling. This would need to be effectively controlled. Careful genetic management of breeding populations would be required to avoid inbreeding depression and maintain adequate genetic diversity – for threatened species this would most likely require movement of animals between captive populations according to a well-managed program (e.g. using the model of zoo species management groups as described in Chapter 4.4). Where evolutionary-significant divergences between populations of a species exist, it may be appropriate to maintain such divergent populations as separate breeding populations in captivity. These issues are addressed in later chapters.

2.1.3 Increasing knowledge of native animal husbandry and ecology

Increased understanding of native animal ecology, particularly threatened species, is important in the development of conservation strategies, including captive breeding. It is possible that keeping of native animals could increase understanding of their behaviour, ecology, husbandry, disease control, survival and reproductive requirements, and veterinary medicine.

Private pet keepers often make substantial contributions to the understanding of husbandry in particular, and may share information through enthusiast networks. Native reptile keepers have made major contributions to the understanding of reptile husbandry in Australia, and in some cases have greater success in breeding threatened species than zoos (L. Vogelnest (Taronga Zoo), pers. comm.). Archer (2002) discovered new information about the reproductive anatomy of the western quoll *D. geoffroii* through keeping it at home – information that had never been reported from taxonomic specimens or zoological collections. In a study of species exported from Madagascar, Mattioli et al. (2006) suggest the large number of private enthusiasts breeding Madagascan herpetofauna have
provided an essential conservation resource through developing and publishing knowledge on husbandry and reproduction. This appears to be a significant and potentially substantial contribution to conservation that more widespread native pet keeping could make, as long as information accrued through private breeding and keeping was disseminated widely, and in particular to conservation managers. This would require overcoming possible commercial incentives to maintain confidentiality regarding successful husbandry techniques.

2.1.4 Generating resources for the conservation of native species

Through a variety of means, a native pet industry could potentially generate funding for and motivate investment in the conservation of threatened species and their habitats (Archer 2002; Hopwood 2001).

Where animals for the pet trade derive from wild harvesting, the industry could provide both funding and incentives for conservation of the wild population and of other species and habitats. For example, in the Maningrida area of Arnhem Land, Northern Territory the Bawinanga Aboriginal Corporation, a community development body, harvests the eggs of long-necked turtles *Chelodina rugosa* to rear in captivity and sell juveniles into the pet market. Funds generated are used directly to support projects associated with land management and turtle conservation (Fordham et al. 2008), such as culling wild pigs and fencing them out of the billabongs during dry seasons, with conservation benefits for turtles and riparian ecosystems generally. In Argentina, harvest of blue-fronted amazons *Amazona aestiva* for the pet trade generated a significant proportion of the income of rural people in some areas (Rabinovich 2005), and this revenue contributed to decisions of local people to retain forested land under low intensity use rather than selling land for conversion to intensive monocrops such as soybeans (Beissinger and Bucher 1992; Rabinovich 2005).

Funding for relevant conservation, research or education projects and initiatives could be raised by imposing an industry levy on those involved in commercial breeding and trade of native animals for private keeping, in the way that rural industries in Australia, for instance, pay a levy that supports research related to rural industries. Alternatively, funding for conservation could be generated on a voluntary basis, driven by conservation-oriented institutions deriving revenue from the pet trade, which they invest back into their conservation work. For example, some conservation-focused institutions breed Madagascan amphibians and reptiles for the pet trade to generate important revenue for their conservation and research activities (Mattioli et al. 2006). More broadly, making captive breeding of native species economically attractive should increase investment into these activities. If carried out using appropriate expertise and following conservation and animal welfare protocols, such activities (even if purely commercially motivated) could benefit threatened or declining species.

2.1.5 Increasing public awareness of the existence and needs of native wildlife

Globally, encouraging the connection between people and wildlife is widely recognised as a critical element in increasing public interest in and concern for biodiversity conservation (Parker 2008). Advocates for native pets argue that if people were more familiar with native animals, they would be aware of these species, value their existence and be concerned for their future, increasing public support for native wildlife conservation in general (Oakwood and Hopwood 1999; Hopwood 2002; Archer and Beale 2004). This could influence their decisions that affect the environment, including support for conservation through mechanisms such as political decision-making by local councils and state and Commonwealth processes, membership of conservation organisations and direct financial support for conservation.

In Australia, there is a very low level of public awareness of native fauna and threatened species in particular (Tisdell and Wilson 2004; Wilson and Tisdell 2005). Archer and Beale (2004) report the results of an informal survey of 40 children carried out in a Sydney suburban shopping centre. When asked to name the first 10 animals that came to mind, all surveyed children named both cats and dogs and only 15% named any Australian fauna, mainly generic taxa such as “kangaroo”.

10
The link between public familiarity with and understanding of threatened species and support for their conservation has been demonstrated in a number of studies. Tisdell and Wilson (2004) found the knowledge of a sample of residents of Brisbane, Queensland, of northern Australian endemic and rare tree-kangaroos (Dendrolagus species) was very poor compared to knowledge of such common species as the koala Phascolarctos cinereus and red kangaroo Macropus rufus. However, after an information and education campaign about the tree-kangaroo and other rare or threatened tropical species, support for conservation measures to protect these species increased, as did people’s willingness to contribute money for conservation. Further, when asked to allocate a hypothetical sum of money ($1000) among a sample of Australian species, education on the threatened and poorly-known species increased the respondents’ allocation of funding to those species, decreasing their allocation to well-known species at lower risk of extinction such as the koala and red kangaroo. Likewise, Wilson and Tisdell (2005) found that public support for the conservation of different bird species depended on their understanding of the species’ existence and status. Knowledge of threatened tropical species was very poor, with most people only being familiar with common local birds such as the kookaburra and magpie. However, provision of information on threatened species increased people’s willingness to allocate their hypothetical $1000 in an increasingly discriminating fashion toward conservation of the more threatened species, at the expense of the common ones.

Butler (1992) examined the effect of a public education campaign on public support for conservation and conservation outcomes for wild Amazona parrots in the eastern Caribbean islands. Before the campaign, most residents were aware of the parrot as a symbol of national pride, but not aware of the conservation problems it faced. The awareness campaign meant local attitudes changed positively towards support for parrot conservation. Accordingly, the Government updated its wildlife legislation to include more severe penalties for rainforest destruction and parrot hunting. As a result, many species of parrot populations increased, especially the rare target species Amazona versicolor of Saint Lucia. Parker (2008) describes how direct community involvement with wildlife can lead to long-term community engagement in conservation. He details the involvement of the public in a process of translocation and in situ conservation of the North Island saddleback Philesturnus rufusater in New Zealand. Involvement and familiarity with the project and the species increased community support for conservation of the birds and led to establishment of ongoing community-based conservation work.

A further example is the contribution made to conservation by some groups of pet breeders and keepers. The World Parrot Trust is an international conservation organisation largely composed of parrot aviculturists and keepers. It raises money for and directly engages in parrot conservation in the field (World Parrot Trust 2009). Likewise, in Australia, societies of keepers of marsupials and reptiles participate actively in conservation activities such as biodiversity surveys (A. Yarde (Marsupial Society of Victoria), pers. comm.), and attitudes of keepers toward native reptiles are generally much more positive than those of non-keepers (J. Sillince (Pet Industry Association of Australia), pers. comm.).

2.2 Arguments against keeping native pets

Set against these potential conservation benefits is a range of arguments against the keeping of native pets, based on potential negative impacts on conservation and animal welfare. Concerns based on concepts of animal rights are also summarised here.

2.2.1 Risking cruelty through failing to care for welfare of animals

A native pet industry could pose animal welfare risks throughout various stages of the pet trade chain, from wild capture to captive breeding to private keeping (Viggers and Lindenmayer 2002; Johnson 2006; DECC 2008). Viggers and Lindenmayer (2002) list welfare issues of concern as including lack of provision of suitable housing and behavioural stimuli, diet-related disease, stress, dumping of unwanted animals, attacks by dogs and cats, failure to meet social requirements for colonial native animals, and potential lack of adequate veterinary and biological knowledge to service native animals. DECC (2008) suggests that some species have specialised requirements such as large outdoor enclosures, that species such as quolls have large home ranges, that the same gender of some species
such as quolls and antechinuses cannot be housed together, that large species can become aggressive, and that most native mammals do not domesticate well and are therefore unsuitable as pets.

**Husbandry, diet and veterinary care**

A key issue is whether native species kept as pets would receive adequate husbandry, diet, and veterinary care. The behavioural needs of undomesticated native animals kept in captivity will be significantly higher than for domesticated animals. Some native mammals are highly unlikely to be suitable as pets due to their biology and specialised requirements in captivity.

Few Australian mammals have a history of widespread private keeping, and much less is known about their husbandry and veterinary requirements than of conventional exotic pets. The Australian Veterinary Association (AVA), the key representative body of veterinarians in Australia, and the RSPCA note that domesticated animals often suffer from neglect due to widespread ignorance of their husbandry requirements. Such ignorance will be greater for native mammals. The AVA points to concerns about existing husbandry problems for natives currently widely kept as pets such as blue tongue lizards, bearded dragons and parrots, and suggests problems could be worse for more “delicate” species (A. Fowler (AVA), pers. comm.).

However, the difficulties cannot be generalised across native species or native mammals, but will very much depend on the particular species. While some species have specialised or poorly known husbandry requirements, and are likely to be unsuitable for private keeping or suitable only for those with specialist expertise or infrastructure, other species are more straightforward and readily live longer than their wild counterparts. Further, knowledge of both husbandry and veterinary requirements is inherently poor before species have been kept, and will increase as keeping becomes more widespread. Experience from herpetological and marsupial societies indicates that native animal keepers are often strongly motivated to learn and share information on husbandry needs of the species they keep. Likewise, veterinarians share information through specialist journals and online fora and when presented with novel species and conditions generally respond quickly to educate themselves about their treatment. Finally, as for cats, dogs, and other mainstream pets, laws requiring adequate husbandry apply and infringements can be prosecuted.

In regard to the above point, it is useful to bear in mind the distinction between traditional domestic pet-keeping and enthusiast native animal-keeping made at the start of this chapter. Many native mammals may not be suitable from an animal welfare perspective as household pets in the average suburban household because of sensitivity to being handled by children or those with no relevant experience, but may be successfully kept in an undomesticated state by enthusiasts with appropriate facilities. For instance many macropods may be successfully kept as undomesticated animals in appropriate facilities, such as paddocks that replicate some features of natural habitat. This practice currently occurs in some states in Australia and even the United Kingdom (where they are used as boutique “lawnmowers”). The Australian Marsupial Society strongly underlines this distinction – it actively encourages keeping of native mammals, and provides a forum for building knowledge on husbandry and veterinary issues, while warning would-be keepers that most marsupials are entirely unsuitable as traditional “pets”.

**Stress**

The degree of susceptibility to stress by native mammals is a key consideration in selection of species to be kept. Some species may have evolved a heightened ‘fight or flight’ response based on adaptations to survival in the wild such as the threat of predation, and such species will be very difficult to keep in captivity. Stress can be difficult to detect or measure (Bellamy 1994), especially in unfamiliar species (Chapple 1989; Schuppli and Fraser 2000). For instance, Chapple (1989) studied the impact of captivity in paddocks and yards on captive-bred chital deer *Axis axis*. This species

---

3 The AVA has an “unusual and exotic pets specialist group” to promote and facilitate discussion of the medicine and surgery of pet species other than dogs and cats.
evolved in India under threat of predation by the Bengal tiger, and has a heightened stress response to captivity. While an animal may ‘appear’ calm, internal physiological responses may reveal significant distress based on massive internal haemorrhage, and elevated blood cortisol levels (Chapple et al. 1991).

Some marsupials are particularly susceptible to stress in particular situations (Shepherd 1983; Bellamy 1994; Johnson 2006). For some, however, captivity may not pose a significant long-term problem. Jones et al. (2005) examined whether capture and transferral into captivity was a significant stressor for wild Tasmanian devils *Sarcophilus laniarius*. While physiological indications (cortisol levels and weight changes) indicated initial stress in response to capture and transfer, subsequent changes suggested animals were not chronically stressed and that they adjusted to captivity after 1-2 months. Note that a native mammal pet industry (for both conservation and economic reasons) would be likely to be based on captive-bred animals, not those taken from the wild, and captive-born animals will not experience the stress of being taken from the wild. Susceptibility of the focal species to stress in captivity is addressed in Chapter 4, especially in regard to stereotypic behaviour, which is widely used as an indicator of stress.

**Large home ranges**

The impact of captivity on animals that have large home ranges in the wild is difficult to substantiate with evidence. Cats and dogs have large home ranges in the wild, including domestic pets turned feral, and yet do not appear to suffer from being kept as pets. However, this remains a significant concern for native species with wild ranging instincts.

**Need to keep genders apart**

The argument that the same gender of some species (including quolls and antechinus) cannot be kept together requires further exploration and cannot be uncritically assumed. For example, for eastern quolls this assertion is not supported by the experience of some breeders, who report that small selected groups including same-sex individuals are routinely kept together outside of the breeding season without problem (T. Evans, pers. comm.).

**Abandonment**

Currently, the RSPCA takes in approximately 160,000 dogs annually because they are lost, homeless or abandoned. Over 63,000 unwanted cats and dogs are euthanased annually in NSW and the number has been increasing each year. Rescue organisations, animal welfare advocates and animal trainers link this problem to pet shops, impulse purchases and mass-breeding practices for profit. A risk with expanded keeping of native mammals is that they may be treated as commodities by the industry, and for purchasers they may be novelties that are bought and then discarded once the novelty wears off. These issues are addressed further in Chapter 4.

### 2.2.2 Removal of animal right to freedom

Animal rights are different from animal welfare (Bekoff 2008). “*Rightists* believe that it is wrong to cause animals any pain and suffering, and that animals should not be eaten, held captive in zoos, subjected to painful experiences, or used in most or any research. They believe that animals have certain moral and legal rights that include the right not to be harmed” (Bekoff 2008, pT4). Animal rights is based on the perspective that animals deserve the same rights as humans and the movement seeks an end to the rigid moral and legal distinction drawn between human and non-human beings, and an end to the status of animals as property. Singer (1997) argues that the ethic of concern for all sentient beings should form a basis for resolving conflicts between the interests of humans and wild.

---

2. [www.clovermoore.com/main/?id=1358](http://www.clovermoore.com/main/?id=1358)
animals, and that there is no ethical basis for discounting the suffering of an animal simply because that being is a member of a different species.

This view posits that wild animals belong in the wild, not in our homes or backyards. The work of animal rights groups is based on the belief that all life has the right to exist in its natural state, and that humans have no right to disrupt, affect, or harm animals in order to meet society’s needs, values or desires. This perspective takes the position that animals are better off not surviving at all if survival means that they no longer exist in the wild. Placing a commercial value on wildlife is considered “fundamentally unconscionable” (M. Pearson (Animal Liberation Australia), pers. comm.). With respect to pet-keeping, the animal rights perspective considers that experiencing and relating to wild animals in their natural environment is the only meaningful way to learn from them and about them, and that a risk of keeping them as pets is that these species may only become known in the domestic context (M. Pearson, pers. comm.).

This report is built on the premise that concern for the welfare and suffering of all sentient beings is important and an appropriate basis for policy, without endorsing the concept of animal rights as the basis for such concern regarding suffering. While it is not necessary to critique concepts of animal rights in detail in this report, it is worth noting that viewing animal suffering as ethically equivalent to human suffering is highly problematic from an ecological perspective, as it could require intervention in nature to prevent suffering of prey at the hands of predators, or the mass die-offs of animals in drought conditions. Further, today no wild animal exists in a state unaffected by humankind, due to our large-scale urbanisation, establishment of agriculture, movement of alien species, management of protected areas, and modification of the atmosphere and water flows. The focus of much animal rights thinking on maintaining a concept of unadulterated “wild” animal life (rather than seeking to ensure their conservation and wellbeing in practice under today’s conditions) may be unrealistic, or at least unlikely to further conservation goals.

2.2.3 Impacting wild populations through escape or release

Keeping of native mammals as pets could lead to accidental or deliberate release of these animals. For instance, the international trade in birds for pets is strongly implicated in establishment of exotic species outside their range (Carrete and Tella 2008), and by analogy the same dynamics could operate within Australia. In SA, experience has shown escapes/releases of pet native animals do happen, although their impacts are hard to judge (P. Copley (SA DEH), pers. comm.). While pets that are deliberately or accidentally released to new areas outside their native range may not be able to overcome the barriers to survival and reproduction, or may be too few to establish self-sustaining populations, if they succeed in establishment they could potentially impact on local native biodiversity through a variety of means (Lindenmayer and Burgman 2005; DECC 2008).

One potential impact is competition for resources with locally native species. Rainbow lorikeets Trichoglossus haematodus moluccanus are native to east and south-east Australia, but a population (approximately 8400 in 2004) has become established in Perth from the escape of less than ten birds from aviaries in the 1960s (Chapman 2005). Today, they compete for potential nest sites and feeding sources, as well as kill nestlings, of local birds such as the Australian ringneck Barnardius zonarius.

Further, escaped or released pets could potentially disrupt wild gene pools of the same or other species through breeding with wild populations. This could involve either inter-specific or intra-specific hybridisation (Cross 2002). Inter-specific hybridisation between closely related species can be promoted by bringing naturally isolated species into contact, and can threaten the continued existence of the local species. For example, the introduction of mallard ducks Anas platyrhynchos into various countries has led to hybridisation with local ducks – in the case of the critically endangered New Zealand grey duck A. superciliosa superciliosa, threatening the native species with extinction (Miskelly et al. 2008). Feral housecats Felis catus threaten the remaining populations of wild cats F. silvestris, in Scotland and southern Africa through hybridisation (Rhymer and Simberloff 1996). We are unable to find any examples of this process occurring in Australia due to human movements (for
pets or for other reasons) of non-fisheries native animal species. However, it represents a possible future threat to the nationally vulnerable Muir’s corella *Cacatua pastinator pastinator* in the south-west of Western Australia. Long-billed corellas *Cacatua tenuirostris* originally from eastern Australia have extended their range (DEWHA 2009), in part due to movement through the pet trade (Low 2002). Their spread into the south-west of Western Australia could potentially threaten the genetic integrity of Muir’s corella (Garnett and Crowley 2000). It should be noted, however, that no such hybridizations have been observed in wild populations (DEWHA 2009), and that the taxonomic status of the corellas has been much disputed, with these two species previously treated as a single one (DEWHA 2009).

Breeding among divergent sub-species or populations of the same species (intra-specific hybridisation) is more likely. It may itself be viewed as problematic from a conservation perspective, regardless of fitness of progeny, by causing “genetic pollution” of a recognised and valued genetically distinct entity. For instance, the genetic distinctness of the dingo *Canis lupus dingo* or *C. familiaris dingo* is threatened by ongoing hybridisation with domestic dogs *C. l. familiaris* or *C. f. familiaris* (Corbett 2001). Among native species, there may be geographic sub-specific variants that people value and seek to preserve, regardless of the fitness consequences. For instance, the Western Australian sub-species of galah *Cacatua roseicapilla assimilis*, is suspected to be under threat from the movement into the Perth area of the eastern Australian sub-species *C. r. roseicapilla* due to aviary escapes (DEC 2007).

Breeding among genetically divergent populations can also have fitness consequences. From the perspective of species conservation, breeding between members of divergent populations can result in either increased fitness of offspring through increasing genetic diversity (‘hybrid vigour’), or decreased fitness through disrupting locally co-adapted gene complexes (‘out-breeding depression’) (Frankham 1995; Rhymer and Simberloff 1996; Tallmon et al. 2004). Out-breeding depression is well documented in plants and is likely to be important in some animal taxa (Rhymer and Simberloff 1996). For instance, there is an extreme genetic fragmentation in different populations of collared lizards *Crotaphytus collaris* in the Ozark Mountains, USA, even though the home ranges of each population are separated only by short distances. Severe out-breeding depression is demonstrated in offspring of released pet lizards and wild lizards (Templeton et al. 1988). However, while conservationists have typically been extremely conservative about mixing populations, there is little evidence of out-breeding depression in larger and more mobile species, particularly of mammals, and its importance is dubious in these taxa (Rhymer and Simberloff 1996). For instance, there is an extreme genetic fragmentation in different populations of collared lizards *Crotaphytus collaris* in the Ozark Mountains, USA, even though the home ranges of each population are separated only by short distances. Severe out-breeding depression is demonstrated in offspring of released pet lizards and wild lizards (Templeton et al. 1988). However, while conservationists have typically been extremely conservative about mixing populations, there is little evidence of out-breeding depression in larger and more mobile species, particularly of mammals, and its importance is dubious in these taxa (Rhymer and Simberloff 1996). Not all genetic variation between populations is adaptively significant (Hedrick 2001). Rhymer and Simberloff (1996) suggest indeed that mixing populations leads far more frequently to increased fitness than to out-breeding depression. For threatened species, the threat posed by inbreeding depression is likely to be much more significant than that posed by out-breeding depression (Frankham 1995; Frankham 1999). Out-breeding depression may be most likely to be significant where genetic divergence is strong and the taxonomic status of species is in question (Frankham 1995). We could find no examples of out-breeding depression due to human-caused movement of animals between wild populations of any native non-fish taxa in Australia. This issue is not therefore considered in this study to be of major importance.

A particular genetic impact on wild populations could arise where captive populations bred for pets have been subject to directional selection for particular “unnatural” or unusual characteristics. All such selection of course involves “natural” colour (or morphological or behavioural) mutations – the “unnatural” component consists of increasing the frequency or extent of the characteristic by selective breeding. This has been a common feature where Australian native animals have been kept and bred as pets over extended periods. Colour examples include the bright blue colour morphs of budgerigars *Melopsittacus undulates* - almost unrecognisable from their wild-type green plumage, cinnamon and lutino (yellow) forms of galahs *Cacatua roseicapilla*, and very light, dark, orange or reddish morphs of central bearded dragons *Pogona vitticeps*, all of which can easily be found through internet searches. For mammals, widespread breeding for keeping could lead to directional selection for behavioural attributes such as docility, socality, ease of handling, and diurnal activity. Conservation concerns arise from directional selection because if such variants are widely kept as pets, escaped or
released animals could impact on wild populations through increasing the extent of the selected-for characteristic. However, it should be noted that among two of the native species most widely subject to directional breeding over the longest timeframe (and, being birds, subject to escape and travel over long distances), budgerigars and cockatiels *Nymphicus hollandicus*, we were able to find no reports of selectively bred colour morphs becoming evident or established in wild populations.

Finally, pet populations could transmit disease to wild populations. For instance, in the USA Johnson et al (2007) found that captive populations of desert tortoise *Gopherus agassizii* carried high levels of a serious respiratory disease, and posed a real threat of infection to the wild population through an estimated 4400 escape/releases per year across California. Indeed, even captive pets could potentially come into contact with wild individuals and transmit disease.

The potential for a higher incidence of keeping of native pets, particularly mammals, to impact on wild populations through increasing the potential threat of establishment of species outside of their native range, through genetic mixing of pet populations with wild-type populations, or through spreading disease should be taken seriously. Experience in Western Australia in particular has demonstrated that movement of native birds as pets can lead to establishment of feral populations, competition with locally native species, and potentially to genetic “pollution” of local sub-species or even species by invaders. However, these risks should not be overstated – for mammals in particular it appears likely that these risks are in practice minor. There has been a high failure rate of deliberate, planned reintroduction efforts releasing significant numbers of mammals into habitat chosen for its suitability (see e.g. Fischer and Lindenmayer 2000). Success in mammalian reintroduction efforts in Australia has generally only been achieved where exotic predator-free fenced areas are established, on islands, or in Western Australia where 1080 resistance among mammals allows intensive baiting of exotic predators. The likelihood that unplanned releases of individuals or small numbers of small native mammals in non-native habitat without predator control would lead to successful establishment of feral populations or significant genetic impacts on wild populations appears small. The threat of disease transmission from captive to wild populations is difficult to judge, as likelihood and impacts are highly species specific. In birds, beak and feather disease (psittacine circovirus) is easily transmitted from captive to wild populations, but we were unable find any examples of such diseases for native mammals other than toxoplasmosis, which native mammals are susceptible to catching from domestic exotic pets.

In considering the effects of native mammals on wildlife, it is appropriate to keep in mind that exotic species currently kept as pets are likely to pose much greater threats to native wildlife through predation than the risks discussed here.

### 2.2.4 Illegal harvesting of animals from the wild

An expanded native pet industry could potentially cause increased problems of poaching from wild populations of the pet species. Impacts of any poaching to meet demand for the pet trade are likely to be exacerbated by potentially high mortality during travel and transport in the trade chain.

Poaching of wild species is driven by the value of the animals in the pet market, which is influenced by the attributes and rarity of the species (Wright et al. 2001). Species kept as pets can be subject to an ‘extinction vortex’, whereby as they become rarer, they become more attractive to keepers and their economic value increases, making poaching even more attractive and driving further declines (Courchamp et al. 2006). For example, because of its appeal for bird keepers and scarcity in nature, the price of Spix’s macaw *Cyanopsitta spixii* in the pet market is very high and so is the economic incentive for poaching. This species of macaw was extensively poached until they were eventually extirpated in the wild in 2000 (Pain et al. 2006). However, this species illustrates not only the dangers of petkeeping but also the contribution keepers can make to conservation. Avicultural organisations have played important roles in spearheading conservation and recovery efforts. Significant populations remain in private hands, with approximately 120 individual Spix’s macaw in captivity, 68
of which are participating in an international breeding program managed by the Institute Chico Mendes of Biodiversity Conservation, the natural heritage branch of the Brazilian Government.

It is possible that legalising keeping of native species could increase the demand for them among (legal) keepers, thus increasing their value and stimulating poaching. Further, legalising keeping of species could make enforcement against poaching and illegal trade more difficult by making it hard to distinguish between specimens in captivity that have been obtained lawfully and those that have been illegally acquired (when all keeping is illegal, any specimens in captivity can be judged as illegal). On the other hand, establishing a ready legal source of supply (whether from captive bred or legal wild harvest) of pet species for those wishing to keep such species could displace an illegal supply, reducing rather than increasing poaching and illegal trade. In particular, the level of poaching is likely to be low for species that are readily available from captive bred sources as the latter are likely to gain a lower price in the retail market. For example, Wright et al. (2001) point out there is no evidence for poaching for neotropical parrots such as blue-headed *Pionus menstruus* and white-crowned parrots *P. seniloides*, which are captive bred and cost under US$500 in the pet market. Legalising breeding and keeping of species could therefore stimulate captive breeding or other legal supply routes, which may be preferred by buyers, displacing illegal poaching and trade.

In Australia (as elsewhere), gaining any clear understanding of the current level and dynamics of illegal harvesting for the pet trade is challenging. A level of poaching and international smuggling of native birds certainly occurs, as evidenced by data from Customs seizures (TRAFFIC 2009). However, it should be noted that in South Australia where native pets are more commonly kept than most other states, illegal harvest of native animals for the pet trade does not appear to have been a problem as far as conservation of individual species is concerned (P. Copley (SA DEH), pers. comm.). Data on wildlife-related offences in South Australia from 2005-2008 indicate a minimum of 75 reports of illegal possession and sale, although further detail on these offences or the taxa concerned are not available.

For many native mammals, it appears improbable that their private keeping would lead to poaching from the wild that would have population-level effects threatening species conservation. The Australian mammals likely to be suitable as pets are primarily nocturnal or crepuscular and secretive, making their catching in commercially viable numbers, particularly for threatened species, highly challenging. Some (like some *Notomys* species) are extremely locally abundant. Mammals will in general require hand-rearing in order to make suitable pets, meaning young juveniles would need to be caught and reared or adults bred in captivity before sale of offspring, further raising costs of illegally sourced animals. If legal captive-bred sources were readily available, it is difficult to see why buyers would not prefer such sources. Further, unlike birds, mammals cannot be easily smuggled as eggs to the high-value overseas markets. However, the potential for illegal harvesting and trade could be a threat for some species that should be addressed by regulatory mechanisms (see Chapter 4).

### 2.3 Focal species

This section applies and assesses the arguments set out above to our designated focal species, referring where necessary to more detailed analyses later in this report.

There is some potential for both species to be kept in place of exotic predators (dogs and cats), thus reducing the impacts of the latter on native wildlife, or mitigating the spread of these threats into new areas. Eastern quolls and Mitchell’s hopping mice both have some potential in this regard, as attractive mammals that are more likely to appeal to current mammal-keepers. The eastern quoll in particular is similar in size and ecological niche to a (small) domestic cat and could fulfil some of the same criteria for a pet.

Both species could potentially benefit from the establishment of larger, secure captive populations. This is particularly relevant for the eastern quoll, the wild population of which is restricted to Tasmania where it has recently become vulnerable to fox predation. There are only a few existing
captive colonies of the eastern quoll in sanctuaries around South Australia, Victoria, Tasmania and NSW (Thomas 2003), and the Secret Creek wildlife sanctuary in NSW is the only one actively managed as a breeding colony on mainland Australia (T. Evans, pers. comm.). Breeding the eastern quoll for the native pet industry could increase the number of eastern quoll individuals, which is important considering the vulnerability of Tasmanian quolls with the introduction of the fox. Larger population size, and a larger number of discrete populations, could safeguard the species against threats such as the fox and other unexpected phenomena such as natural disasters or outbreak of disease, as in the rapidly decimated populations of Tasmanian devils (Loh et al. 2006). Well-established populations in captivity would also benefit reintroduction efforts, which will be necessary if the species is ever to regain a functional role in parts of its mainland habitat. Mitchell’s hopping mouse is a lower conservation priority compared to eastern quoll – it shows a stable population trend within its current distribution. Even though its habitat is much reduced, it is not endangered and is being bred for pets by private keepers in several states. Captive colonies of the Mitchell’s hopping mouse could be useful safeguards in case of further threatening processes such as land clearing and degradation. Such colonies would assist ecosystem restoration efforts where it not only threatened species are of benefit to reintroduce. However, in both cases, to contribute to such conservation benefits, breeding in captivity would need to ensure that wild-type genetics are maintained. Mechanisms to achieve this are discussed in Chapter 4.

Increasing the knowledge of husbandry and ecology of both species would be valuable, and could bring conservation benefits for eastern quolls given their more vulnerable conservation status. As outlined above (section 2.1.3), for example, private keeping of the western quoll as a pet led to discovery of bizarre and unexpected male reproductive anatomy and behaviour in this species, knowledge that could be critical to conservation breeding in the case of a conservation crisis. Likewise, in the case of an outbreak of disease in the wild population, knowledge of intra specific interactions, feeding ecology, and reproductive behaviour gained from widespread keeping could be valuable in understanding the dynamics of disease transmission.

In terms of generating funds for conservation, this again is likely to be higher relevance for eastern quolls than for Mitchell’s hopping mouse, given their higher conservation priority. A levy on all sales would raise money that could be channelled to government or non-government conservation, reintroduction, or habitat restoration or conservation efforts. It could be directed, for instance, to supporting efforts to establish predator-free areas for quoll reintroduction on the mainland, or establishing breeding colonies to build population numbers. Additionally, current, conservation-focused breeders of eastern quolls could sell a proportion of their animals as pets to raise much needed revenue to continue breeding efforts. In particular, male offspring contribute little to building captive population numbers and could be sold as pets, enabling breeders to finance their efforts. At NSW’s quoll breeding facility Secret Creek Sanctuary, which has (restricted) access for the public, inquiries from the public regarding obtaining quolls to keep as pets are common (T. Evans, pers. comm.), suggesting this route could potentially be viable. For both species, it is unlikely that wild harvest would generate revenue and incentives for habitat conservation, as wild harvest is unlikely to provide an economic source of supply compared to their captive breeding.

Public awareness of these species and native wildlife in particular would be likely to be boosted by widespread keeping of both species. Accurate information on the level of public awareness of these species is not available. However, anecdotal evidence suggests that knowledge of eastern quolls is very low – the operator of Secret Creek Sanctuary reports that few people who visit the facility are aware of the species’ existence or of its threatened status (T. Evans, pers. comm.). If keeping of this pet is adequately accompanied by education and awareness material or activities, there could be a significant impact on public awareness, and increasing public awareness of the existence of, and threats to the survival of quolls can translate into a motivation to conserve them in the wild, which could have a range of outcomes in support of their conservation.
These potential benefits all appear plausible for these focal species. One argument against their keeping is the risk of poor welfare outcomes for the two focal species. Their welfare in private keeping will depend very much on their specific characteristic and requirements, and whether effective efforts to maintain adequate standards of care can be made. These issues are discussed in more detail in Chapter 4.

If the two focal species were widely kept it is inevitable that animals would at least occasionally escape or be deliberately released. For eastern quolls on the mainland, there is of course no risk posed by competition or genetic mixing with the wild population, as there is no wild population. What is more important, however, is maintaining adequate representation of wild-type genetics in the captive population, in order that this population remains of conservation value and suitable for reintroduction. Means to assure this are discussed further in Chapter 4. For Mitchell’s hopping mouse, it is possible that escapees could establish populations that could compete with wild populations of other species. However, Notomys species are currently kept privately in various states, and no reports have yet surfaced of “feral” colonies being established. In any case, it is likely that any place containing suitable habitat for Mitchell’s hopping mouse is indeed within its native range, so establishment of colonies outside its native range is unlikely to be a problem. Inter-specific hybridisation is an issue for Notomys, with Mitchell’s and Spinifex hopping mice readily interbreeding in captivity. It is plausible that if Mitchell’s hopping mice were more widely kept, escaped Mitchell’s hopping mice or hybrid mice could escape or be released, and these individuals could breed with spinifex or Mitchell’s hopping mice. However, the likelihood that enough individuals would escape in appropriate habitat, and survive to affect in any significant way the genetic composition of these locally abundant species, is so low that this risk can be discounted.

Establishing eastern quolls and Mitchell’s hopping mice as pets could provide incentives for people to illegally take them from the wild for sale in Australia or overseas. Eastern quolls are straightforward to trap (P. Gowland, pers. comm.) and are likely to be of high value, given their likely prices as pets in the market (see Chapter 4). Recently, concern about potential take from the wild was given by the Department of Sustainability and the Environment in Victoria as the rationale for keeping eastern quoll in the most restrictive category of animals for keeping (see Appendix C2 Table C.3). However, their poaching would require accessing wild populations in Tasmania, and given that animals have large home ranges and are thinly spread, poaching may not be economic against legal, captive-bred sources. However, it remains a distinct threat. For Mitchell’s hopping-mice, the readiness with which the species breeds in captivity (see Chapter 4), and the size of wild populations, means that illegal harvest is highly unlikely to pose any conservation threat given the size and vulnerability of the wild population. There is a risk of illegal trade to overseas buyers, and it is possible that expanding domestic legal keeping of quolls would make it more likely that illegal exports would occur. Having a larger legitimate population in private hands, rather than the small number of legitimate populations kept today, could provide a cover for animals destined for illegal trade overseas. Today regulatory agencies may be able to detect illegitimate movement of animals to illegal sources due to the low numbers in private hands, whereas a larger captive breeding population may be more difficult to police. Means to deal with these potential threats are discussed in Chapter 4.
2.4 Summary

1. Domestic and feral cats are highly destructive invasive pests, and domestic pets readily and regularly become feral. Native pets could potentially replace some exotic predators as pets, reducing the impact of the latter on native wildlife. While any such replacement is likely to be at a very small scale, especially in the near future, native mammals including eastern quolls and Mitchell’s hopping mice could be particularly important in providing a viable alternative pet in areas of ecological sensitivity, either voluntarily or in support of local restrictions on cat and/or dog ownership.

2. Breeding and maintaining native species for keeping as pets could potentially contribute to the maintenance, security and genetic health of populations, and provide a captive source for reintroductions. For eastern quolls, with only a single breeding captive population and the remaining Tasmanian population vulnerable to fox predation, this could be an important conservation benefit. For Mitchell’s hopping mouse, of lower conservation priority, this I less important, although a captive breeding stock could provide animals for reintroductions where biodiversity reconstruction is the objective. However, for threatened species in particular this would require careful genetic management of the breeding stock to maintain wild-type genetics, avoiding the selective breeding for unusual or exaggerated characteristics that often takes place when species are bred for the pet market.

3. Private animal keepers often make significant contributions to understanding of the husbandry and biology of the species kept. More widespread native pet keeping, including of the focal species, could contribute to conservation through increasing the relevant knowledge base, as long as information accrued through private breeding and keeping was appropriately published or disseminated to make it available to conservation managers.

4. Funds to support relevant conservation, research or education programs could be generated through a government levy exacted on the native pet industry, similarly to levies currently in place for a number of Australian industries, which is returned to conservation or research projects. Further, it is possible that a native pet industry could provide a source of revenue for conservation-oriented organisations involved in captive breeding of the species involved, allowing them to raise revenue for conservation projects by selling a proportion of offspring bred or offspring of particular species. If captive breeding became economically attractive through an expanded native mammal pet industry, this could drive investments in captive breeding that under some conditions could benefit conservation. These mechanisms could potentially operate in the case of eastern quolls and Mitchell’s hopping mice.

5. Lack of public awareness of native wildlife, particularly uncommon threatened species, necessarily translates into a lack of motivation to conserve them. Encouraging the connection between people and wildlife is widely recognised as a critical element in increasing public interest in and concern for wildlife, which can have a range of outcomes that support their conservation. Awareness of eastern quolls and Mitchell’s hopping mice is low in the general public and their widespread keeping could potentially sensitise people to the existence and needs of native wildlife.

6. The welfare of native mammals kept as pets could be poor. The risk here is highly species-specific, and will depend on the needs of the particular species for suitable housing and stimulation, health care, diet and social life, and their vulnerability to stress, disease, and attacks by dogs and cats. Suitability of our focal species in this regard is explored further in Chapter 4.

7. Keeping of native mammals as pets carries a risk of accidental or deliberate release of these animals. Such releases are in general unlikely to establish self-sustaining populations, but carry the risk of impacting on local native biodiversity through competition for resources with locally native species; disease transmission; and escaped or released pets disrupting wild gene pools of the same or other species through inter-breeding with wild populations. A particular genetic impact on wild populations could arise where captive populations bred for pets have been the subject of directional selection for particular “unnatural” or unusual characteristics such as body size or colour, or for “domestic” attributes such as docility, ease of handling, and lack of fear of humans. For eastern quolls, the lack of any wild population means that on the mainland most of
these risks are negligible. In view of its conservation status, however, maintaining wild-type genetics is extremely important for this species. For Mitchell’s hopping mouse, any habitat suitable for colonisation is likely to be within its historic native range, meaning establishment of feral populations is unlikely to be problematic. While the potential for interbreeding with other Notomys species exists this is unlikely to be of any conservation significance. Neither species is known to carry diseases in captivity that could pose threats to wild populations.

8. Poaching from wild populations could be stimulated by increasing demand for native mammals as pets. However, if animals are more readily and cheaply available from captive bred sources this will reduce incentives for traders to purchase illegally sourced animals and reduce the incentive to poach. It may also be that many mammals will require hand-rearing in order to make suitable pets, decreasing the returns from poaching. For quolls, poachers would need to access remaining wild populations in Tasmania, which might mean poaching was unlikely to be economic. No reports of illegal harvest or trade of Mitchell’s hopping mouse have been found, despite it being legally kept in several states. However, poaching and illegal domestic and international trade remain a substantive potential risk.

2.5 Conclusion
There is a range of potential conservation benefits that could be gained by establishing and expanding the range and extent of keeping of native mammals, particularly where these would replace introduced predators as pets, and there are a number of negative side-effects that such a development could potentially entail, for native wildlife (in the wild) and for the welfare of the species kept.
3 Regulation of keeping, breeding and trade of native fauna as pets

3.1 Introduction
This chapter outlines the regulation in place in Australia governing the private keeping, breeding and trade of native animals as pets. Any use of native fauna in Australia, including pet-keeping, takes place within a complex regulatory environment. This includes legislation, subordinate legislation and administrative “quasi-legislation” – codes, standards, and policies. While invertebrates and fish are kept as pets, this review of regulation is restricted to the use of native mammals, amphibians, birds and reptiles, and the term “animal” is used here to include only these taxa.

The protection and management of Australia’s native fauna is primarily regulated at a state and territory level (note that where this report refers only to states this should be understood as including territories). The sets of legal and regulatory arrangements governing the use of native fauna are often complex and vary substantially across jurisdictions. All states allow for the keeping, possessing, breeding, buying, selling or disposing of certain native species (including unprotected, protected and threatened species), provided the animal has been obtained from a legal source and subject to laws, regulations, policies and guidelines. In general, the keeping of native mammals in all jurisdictions across Australia requires a licence or permit. Permit systems regulate the use of native fauna as pets, with specific licensing requirements depending on:

- the species involved
- the nature of the activity (keeping, breeding, trade etc) and
- whether the animal is used for “private” or “commercial” purposes.

Spinifex hopping mice can be kept in several jurisdictions. Courtesy Fred Ford.
3.2 Overview of regulation and licensing across jurisdictions

Regulation and licensing requirements for keeping, breeding and trading of native fauna are complex and vary considerably across the different states. Key relevant legislative instruments in each state are summarised in Appendix B, and a range of more specific regulations, policies and guidelines exist in many states. In addition to nature conservation and wildlife acts, other legislation such as animal welfare and threatened species acts may also be relevant. The approach of each state is summarised in Table 3.1 and 3.2, with full details of the legislative framework and licensing system for each jurisdiction shown in Appendix C.

3.2.1 What factors determine the regulation of keeping, breeding and trade?

The purpose for which fauna are used is the main determinant of which state laws and regulations apply, and the permits or licences required. Most states distinguish between the keeping of native fauna for the following purposes:

- pets
- exhibition or display
- scientific or educational purposes
- rehabilitation of sick or injured animals
- control of nuisance animals
- production
- taxidermy.

In some jurisdictions, several of these categories of use are covered under a generic legislative framework, while other states or Territories have specific laws and regulations governing specific use categories.

The protection status of the species involved is also an important factor in determining which rules and regulations apply. The majority of Australian native mammals, reptiles, birds and amphibians are declared protected species by state and territory governments, but protected species laws and individual species’ protection status differ from state to state. In most states, all native fauna other than “pest” species are protected in the wild, with additional protection measures sometimes granted for threatened species. As a general rule legislative protection means that it is an offence to take protected fauna from the wild without authorisation. In most states, in practice, permits to take live animals from the wild will not be granted for private or commercial use in the pet industry. SA, WA and NT form notable exceptions to this rule, with provision in their regulations for the issue of licences to trap certain native species for the pet trade.

The level of specialist knowledge or experience required to keep the species may also affect licensing requirements. Some jurisdictions employ different licence categories with the licence class depending on the level of specialist knowledge or experience required to keep the species (and/or its conservation status in the wild).

Different regulations often apply to “private” (recreational) and “commercial” keeping, breeding and trade, with the latter more tightly restricted than the former. This distinction is not always clearly defined in relevant legislation or policy. However, in general a private keeper holds native animals for the purpose of maintaining a private hobby collection, with any trade being incidental to this, whereas the main purpose of a commercial keeper is to deal in native fauna for gain or reward. All Australian jurisdictions allow for the private keeping of certain native fauna for recreational purposes, while conditions for commercial keeping are more restricted (Table 3.1, 3.2 and 3.3).

Provisions providing for fines and/or imprisonment for transgressions of regulations are in place in all jurisdictions.
<table>
<thead>
<tr>
<th></th>
<th>Private keeping, breeding and trade</th>
<th>Commercial keeping, breeding and trade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Birds</td>
<td>Reptiles</td>
</tr>
<tr>
<td><strong>NSW</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exempt*</td>
<td>41</td>
<td>-</td>
</tr>
<tr>
<td>Under licence</td>
<td>141</td>
<td>222</td>
</tr>
<tr>
<td><strong>Victoria</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exempt</td>
<td>&gt;25</td>
<td>7</td>
</tr>
<tr>
<td>Under licence</td>
<td>81</td>
<td>120</td>
</tr>
<tr>
<td><strong>NT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exempt</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>Under licence</td>
<td>All except restricted spp</td>
<td>All except restricted spp</td>
</tr>
<tr>
<td><strong>Tasmania</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exempt</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Under licence</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td><strong>SA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exempt</td>
<td>51</td>
<td>18</td>
</tr>
<tr>
<td>Under licence</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td><strong>Queensland</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exempt</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>Under licence</td>
<td>108</td>
<td>All except 25 threatened spp</td>
</tr>
<tr>
<td><strong>WA</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exempt</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Under licence</td>
<td>All</td>
<td>37</td>
</tr>
<tr>
<td><strong>ACT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exempt</td>
<td>All except 10 protected spp</td>
<td>5</td>
</tr>
<tr>
<td>Under licence</td>
<td>10</td>
<td>All</td>
</tr>
</tbody>
</table>

* exempt = no licence required
Table 3.2 Licensing requirements in the states and territories for private and commercial keeping, breeding and trade of native mammals as pets

<table>
<thead>
<tr>
<th>Private keeping, breeding and trade</th>
<th>Commercial keeping, breeding and trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>Dingo exempt&lt;br&gt;Spinifex hopping mouse and plains rat under Native Animal Licence Class 1</td>
</tr>
<tr>
<td>Vic</td>
<td>15 species with Private Wildlife Basic Licence (see Appendix C)&lt;br&gt;29 species with Private Wildlife Advanced Licence (Appendix C)</td>
</tr>
<tr>
<td>NT</td>
<td>Spinifex hopping mouse exempt&lt;br&gt;All other species may be kept under a Permit to Keep or Trade Protected or Prohibited Wildlife</td>
</tr>
<tr>
<td>Tas</td>
<td>Brushtail possum, Bennett’s and rufous wallaby exempt&lt;br&gt;Common wombat under a permit</td>
</tr>
<tr>
<td>SA</td>
<td>Dingo unprotected&lt;br&gt;Brushtail possum, plains rat and spinifex hopping mouse exempt&lt;br&gt;25 species with Basic Permit to Keep (Appendix C)&lt;br&gt;All other species can be kept under a Specialist Permit to Keep, with applications being considered on their merits</td>
</tr>
<tr>
<td>Qld</td>
<td>Not permitted</td>
</tr>
<tr>
<td>WA</td>
<td>Not permitted</td>
</tr>
<tr>
<td>ACT</td>
<td>Not permitted</td>
</tr>
</tbody>
</table>

Table 3.3. Licensing requirements in states and territories for private and commercial keeping, breeding and trade of Mitchell’s hopping mouse and eastern quoll

<table>
<thead>
<tr>
<th>Mitchell’s hopping mouse</th>
<th>Commercial</th>
<th>Eastern quoll</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>Commercial</td>
<td>Private</td>
<td>Commercial</td>
</tr>
<tr>
<td>NSW</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
<tr>
<td>Vic</td>
<td>Private Wildlife Basic Licence</td>
<td>Commercial Wildlife Type 1 Licence</td>
<td>Not permitted</td>
</tr>
<tr>
<td>NT</td>
<td>Permit to Keep or Trade Protected or Prohibited Wildlife</td>
<td>Permit to Keep or Trade Protected or Prohibited Wildlife</td>
<td>Permit to Keep or Trade Protected or Prohibited Wildlife</td>
</tr>
<tr>
<td>Tas</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
<tr>
<td>SA</td>
<td>Basic Permit to Keep and Sell</td>
<td>Basic Fauna Dealer Permit</td>
<td>Specialist Permit to Keep and Sell</td>
</tr>
<tr>
<td>Qld</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
<tr>
<td>WA</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
<tr>
<td>ACT</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
</tbody>
</table>

3.2.2 Animal welfare legislation and codes of practice

Each state and territory has legislation relating to animal welfare and the prevention of cruelty to animals, and there is a wide variety of more or less specific codes of practice, policies or guidelines for keeping of animals across most states and territories (see Appendix B). Such codes of practice are commonly in place for the keeping of birds and reptiles in captivity and for animals in pet shops. The legal status of these codes varies significantly between states. SA is the only jurisdiction where model
codes of practice are regulated, making compliance with their requirements mandatory. In other states, compliance with codes of practice is a requirement for a fauna licence renewal, or it is voluntary. Enforcement relating to animal welfare is usually vested in designated officers of state government departments, officers of the Royal Society for the Prevention of Cruelty to Animals (RSPCA) and Animal Welfare League, and members of the police force. In practice, the bulk of prosecutions are made by RSPCA officers.

There are concerns regarding the adequacy of this welfare regime. Bekoff (2008) argues that “good welfare isn’t good enough” on the basis that existing laws and regulations still allow inhumane treatment of animals. The New South Wales (NSW) Parliament announced in October 2009 an upgrade to the code of practice for pets in NSW pet shops and an inquiry into companion animal welfare\(^7\). The inquiry will investigate widespread concerns about companion animal welfare including regulation of pet sales and the economic, social and environmental costs of the large number of unwanted pets\(^8\).

The Pet Industry Association of Australia (PIAA) has a self-regulation mechanism whereby breeders, suppliers and retail members of the Association have to sign a legal declaration that they comply with PIAA’s *Animal Care Guidelines for the Retail Pet Industry* and the PIAA *Members Code of Ethics*\(^9\). The Association runs a system of complaints management against the codes, and complaints result in a range of actions from explanation or counselling a member, through to removal from membership or referral to a regulatory agency.

There is currently no code of practice in use by any state government or non-government organisation that specifically covers the keeping or retail of native mammals. The Bureau of Animal Welfare of the Department of Primary Industries, Victoria, in consultation with the Marsupial Society of Victoria, is currently in the process of developing a *Code of Practice for the Private Keeping of Australian Mammals*. The Code will apply to native mammals that can be kept in Victoria under a licence.

Closely related are codes of practice for rescue and rehabilitation such as the NSW DECC draft code 2010\(^10\) and the Victorian revised (2001) *Code of Practice for the Welfare of Wildlife during Rehabilitation*\(^11\), to ensure the welfare of animals undergoing all stages of wildlife rehabilitation.

### 3.2.3 Which native animals can be kept?

In some jurisdictions, lists of which native fauna can be kept as pets are set out in legislation. In Victoria, Queensland, WA and Tasmania, fauna schedules to the relevant conservation regulations specify the native species that can be kept under licence or are exempt from licensing requirements. In the Australian Capital Territory (ACT), species exempt from licensing requirements are listed in the *Nature Conservation Declaration of Protected and Exempt Flora and Fauna 2002* (No. 2). In other states such as NSW this is a matter of policy or practice rather than set out in legislation.

Keeping of native reptiles, birds and amphibians is much more established across Australia than keeping of native mammals. A wide variety of native birds, reptiles and amphibians can be kept privately in all states and territories (Table 3.1, for full list of species in each jurisdiction see Appendix D). For native mammals, however, the scope of species that can be kept ranges from none at all in Queensland, WA and the ACT, to very limited in NSW\(^12\) (three species) and Tasmania (four species), to all native mammals in SA and the NT (Table 3.2, Appendix D). All states employ an “exempt” list featuring common animals that are easy to keep in captivity (Table 3.1) – exempt animals can be privately kept, bred and sold without requiring licensing. However, very few native mammal species

---

\(^7\) www.clovermoore.com/main/?id=2556
\(^8\) www.clovermoore.com/main/?id=1358
\(^9\) For a copy of the code see http://www.piaa.net.au/~piaa/documents/code%20of%20ethics%20010409.pdf
\(^10\) www.environment.nsw.gov.au/animals/FaunaDraftCOP.htm
\(^11\) www.dpi.vic.gov.au/dpi/reininf.nsf/LinkView/B60B567FD0CF8A42CA256C19000EFC3E7F8E4DBA5A6FD04A256DEA0027A820
\(^12\) http://www.environment.nsw.gov.au/wildlife licences/cantkeepnativemammals.htm
are classified as exempt (Table 3.2). All non-exempt native fauna that can be kept privately require a permit or licence issued by the state fauna protection agency. A full list of all native mammal species that can be kept (either with or without licence) in each jurisdiction is provided in Appendix D. Regulators in state government agencies tend to base their decisions relating to which species should be exempt on the basis of whether species have traditionally been widely kept, rather than in consideration of conservation aspects.

Under the current legislative framework, several jurisdictions (Victoria, NT and SA) would allow for the keeping and/or trade of Mitchell’s hopping mouse and eastern quoll under certain conditions (Table 3.3). In October 2009, regulations came into effect in Victoria to make it easier and less expensive to keep some species of wildlife (see Appendix C2). The eastern quoll, amongst other mammal species (see Appendix C2), was proposed for listing on a schedule that would have allowed keeping. However, the Department of Sustainability and the Environment decided not to take this step.

### 3.2.4 Private and commercial animal keeping, breeding and trade

Holders of a licence to keep native fauna for private/recreational purposes are allowed to breed approved species as a hobby collection, with trade or sale of excess stock permitted between licensees. However, these private keepers cannot sell or trade species from a shop or business premises. In most states, the trade (including selling, swapping or giving away) of native species between private licensees is further restricted by requiring the owner to retain an animal for a period of six months prior to transfer unless that person has bred the animal. Additional conditions for private sale (including swapping or giving away) exist in most states. For instance, in NSW, advertising is restricted to publications of animal keepers’ societies of which the licensee is a member, and in Victoria, Western Australia and the ACT, notification to the relevant authority prior to sale is sometimes requested.

For the commercial keeping, breeding and trade of native fauna other than exempt species, a dealer’s licence is required, which has various names in different jurisdictions. The Northern Territory is the only jurisdiction that lacks a specific dealer’s licence (with native species being kept and traded both privately and commercially under a Permit to Keep or Trade Protected or Prohibited Wildlife). A dealer’s licence authorises the holder (subject to conditions) to possess, keep, breed, buy, sell or dispose of a range of native fauna on a commercial basis from a retail outlet, shop or business premises. Note that regulations in several states (Victoria, Tasmania, SA and Queensland) prohibit both private and commercial keepers from knowingly breeding a hybrid of a protected species.

Commercial trade of approved native birds under a dealer’s licence is allowed in all states and territories (Table 3.1). Certain native reptile and amphibian species can be traded commercially under a licence in several states (Victoria, NT, SA, WA (reptiles and amphibians), Queensland (only reptiles) and ACT (only amphibians)) (Table 3.1). However, commercial trade of native mammals is restricted to Victoria, the NT and SA, and Victoria further limits this trade to a specified list of species (Table 3.2). For a full list of which species can be kept, bred and traded commercially see Appendix D. As with the private keeping of native fauna, different dealer licence classes may be required depending on the species involved. In some states, commercial dealer licence applications need to be supported by information on facilities, prior experience and management, particularly to obtain an endorsement to trade in species of high conservation value, potentially dangerous species or animals requiring specialist care. In certain cases, licence approval is subject to an onsite inspection of the premises where the animals will be kept. All states and territories require a dealer licence holder to maintain accurate and up-to-date records of all transactions and to submit periodic returns.

The situation regarding property rights in native animals held under licence in Australia is complex and ambiguous (Productivity Commission 2001, King et al 2007, Cooney 2008). In some jurisdictions property rights are fully or partially specified. In Queensland, for instance, “all protected animals are the property of the state” until taken under licence, at which point they become the property of the licence holder (Queensland Nature Conservation Act 1992 s83). In NSW, protected fauna other than “prescribed fauna” ‘are the property of the state until captured or killed’ (NSW National Parks and
Wildlife Act 1974 s97). In Victoria, SA, Tasmania and the ACT, there are no defined property rights for native fauna, but Crown ownership is often assumed, and is arguably implicit in the requirement for Crown authorisation for most activities generally associated with ownership (such as trading). The precise nature of property rights for those who seek to move or sell animals held under licence is often unclear and untested (Cooney 2008, Productivity Commission 2001). For example, who owns wildlife may depend on whether the animals are judged “captive” or “wild”, and this may depend on factors such as size of enclosure and reliance on management. An additional layer of ambiguity may result from movement of animals across state borders, meaning licence holders will become subject to a different set of rights and obligations associated with licence holding as animals cross borders.

3.3 Import and export

The interstate import and export of native fauna is subject to monitoring and regulatory controls by the fauna protection agencies in each state and territory. Apart from exempt species, import/export licences are required in all jurisdictions for the interstate transfer of native fauna. Interstate import or export of native fauna without the relevant import/export permit is an offence under state law, as is trading with a person who does not hold a valid licence to keep or trade that fauna under state law (e.g. exporting an animal interstate to someone who does not hold a valid licence to keep that animal). Likewise, a pet owner legally keeping a native mammal in a permissive state such as South Australia who wishes to bring his/her pet to a restrictive state such as Queensland would require an import permit from Queensland. As states generally do not issue import permits for species for which they do not issue keeper’s licences, the keeper will not be able to bring his/her pet to Queensland. Note, however, that a private keeper of several native mammal species in NSW has effectively appealed against a NSW restriction on import of several species from Victoria (Anonymous private keeper, pers. comm.), by invoking section 92 of the Commonwealth Constitution, which provides for trade, commerce and intercourse between the states to be “absolutely free”. Restrictions placed on interstate trade in wildlife as a result of the disparity of state licensing laws arguably represents an infringement of s92. As a result, this keeper imports from Victoria and keeps under NSW licence a variety of native mammals for which a licence would not have been granted under NSW policy (in NSW a licence is only granted for the private keeping of the plains rat and spinifex hopping mouse (Table 3.2a). Attempts to prevent interstate trade in wildlife have been rejected by the High Court on several occasions.13

International movement of native species is regulated by the Commonwealth under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC). The export of live native household pets may be allowed only if the export is not primarily for commercial purposes, and only if the pet is from a specified list of native household pets (EPBC s303FG). This list contains six birds only and no native mammals.14

3.4 Companion animal legislation

While the keeping of native fauna as pets is governed by conservation and wildlife legislation, the keeping of dogs and cats is governed under companion animal legislation, which operates on a state and local government level. This approach offers a useful contrast to regulation of native pet-keeping. Licensing of dogs and cats is not required. The focus of companion animal legislation is on identification and registration, with some jurisdictions also requiring de-sexing. In all jurisdictions except the NT, council registration of dogs is mandatory under state-level legislation and NSW, Victoria and Queensland further require council registration of cats. Identification with either a collar and/or a microchip is compulsory for dogs in public areas in most states and territories. Cats do not require identification in SA, Tasmania, WA and the NT. Microchipping of dogs and cats is mandatory only in NSW, Queensland and the ACT. The ACT is the only jurisdiction that requires de-sexing of companion animals, but most other states offer a financial incentive for de-sexing by offering reduced registration fees for de-sexed animals.

---

3.5 Captive breeding for conservation

In all states, breeding of native fauna for conservation is covered by a different licensing system from breeding for pets. In most states, captive breeding for conservation is authorised by a licence covering use for scientific, educational or conservation purposes, or, where fauna are exhibited, for keeping for exhibition or display. Display or exhibition licences are issued by wildlife authorities in some jurisdictions, whereas in other states (e.g. NSW, Victoria and Tasmania) they are administered by agricultural/primary industry authorities. Whether a facility that primarily breeds native fauna for conservation or educational purposes is allowed to sell or trade excess stock to other facilities and/or the general public, is dependent on the conditions of the license they operate under and the jurisdiction they are in, and may rely on gaining permission on a case-by-case basis from regulatory authorities. These differences in regulations across jurisdictions increase the difficulties in maintaining control of captive breeding programs across Australia (Paul Andrew (ARAZPA), pers. comm.).

3.6 Issues and implications for focal species

In some jurisdictions in Australia, allowing eastern quolls and Mitchell’s hopping mice to be kept as pets would require legislative change, while in others changes to policy and practice are all that would be required. In Victoria, Queensland, WA and Tasmania, the focal species would need to be added to the relevant fauna schedules in the wildlife regulations that record the native species that can be kept under licence or are exempt from licensing requirements. In the ACT, the Nature Conservation Declaration of Protected and Exempt Flora and Fauna 2002 (No. 2) would need to be amended to include Mitchell’s hopping mouse and eastern quoll. In NSW, a change in policy would be sufficient to allow for the private keeping of both focal species under a general licence. The disjunct between breeding for commercial and conservation purposes may raise complexities in developing a licensing system for native mammals that aims to integrate these two imperatives.

Most jurisdictions have a consultative committee that advises the relevant government department or minister about changes to wildlife regulation or policy (e.g. NSW’s Native Animal Keepers’ Consultative Committee (NAKCC), Victoria’s Wildlife Possession & Trade Advisory Committee (WPTAC), ACT’s Flora and Fauna Committee). Private individuals or organisations can make submissions to such consultative committees requesting regulatory or policy change. As noted earlier, a recent submission of the Marsupial Society of Victoria to the WPTAC to add the eastern quoll to Schedule 4 of the Wildlife Regulations (allowing it to be kept under an Advanced Licence), was rejected. A private individual in NSW is in the process of preparing a submission to NAKCC with regard to expanding the range of native fauna available to private keepers in NSW, to include those available to Victorian and South Australian keepers (P. Brien, pers. comm.).

Concern regarding the introduction of species outside their natural range may mean that policy change may be harder to achieve in those states outside the native range of the focal species. For example, the Northern Territory (NT) distinguishes between species native to that state and other species in terms of licensing requirements. The former geographical range of both species is limited to southern Australia, so in jurisdictions outside this range there may be more reluctance to allow keeping of these species.
3.7 Summary
1. Regulation of the keeping of native pets in Australia is carried out by states/territories. It is complex and varies significantly from state to state.
2. All jurisdictions allow some native animals (including mammals) to be kept as pets, and regulate keeping through licensing/permitting systems. In each jurisdiction some native species are exempt, while others can be kept under licence. In some jurisdictions there are different licence categories for species requiring more experience/expertise.
3. Keeping of native mammals is, in most jurisdictions, more tightly restricted than keeping of native reptiles and birds.
4. States vary widely in terms of permissiveness of native mammal keeping, from allowing all mammals to be kept (NT, SA) to none (Queensland, WA, ACT).
5. Changes required to enable eastern quoll and Mitchell’s hopping mouse to be kept as pets depend on the jurisdiction. In some states/territories this would require changes to legislative schedules, while in others only a change in policy and practice would be required. Most states have a consultative apparatus in place to channel advice regarding policy changes to the relevant department.

3.8 Conclusion
Private keeping of native mammals as pets is tightly restricted in most jurisdictions in Australia, much more so than keeping of native reptiles and birds. Expanding keeping of native mammals would require legislative or policy change in most states and territories.
4 Industry feasibility: biological, social, regulatory and economic factors

In this chapter we build on the background analysis presented in previous chapters to address the primary purpose of this report – examination of the feasibility of the widespread keeping of native mammal pets, both as an industry and as a component of a conservation strategy. The feasibility of a native mammal pet industry depends on a wide range of factors, ranging from biological factors such as the suitability of particular native species and economic factors such as market demand to animal welfare aspects, public attitudes and the regulatory environment. This chapter discusses a wide range of relevant factors and then presents a recommended model for a native mammal pet industry. In this chapter in particular our focus is on the two focal animals – eastern quoll and Mitchell’s hopping mouse.

4.1 Suitability of focal species

A fundamental initial issue is whether native species are suitable to be kept as pets. This directly addresses the concern for animal welfare consequences of a native pet industry, raised in section 2.2.1 above, as well as addressing broader questions of feasibility such as public health aspects and ease of husbandry. In this comparison it should be borne in mind that the appropriate standard is a comparison of native mammals against those mammals that are accepted by society as appropriate pets, such as cats and dogs. It is likely that all species have some drawbacks as pets – for instance, cats can spread toxoplasmosis to humans, and dogs can be noisy and occasionally attack and kill children.

Northern Territory native animal keeper with pet northern quoll. Courtesy Greg Miles.
Schuppli and Fraser (1999) and the National Consultative Committee on Animal Welfare (NCCAW) have proposed the following factors as a basis for determining suitability of specific species to be kept as pets:

- adequate knowledge of the species with respect to nutritional and environmental requirements, health care, recognition and prevention of stress, and requirements for exercise, social interaction and natural behaviour;
- availability and affordability of suitable food, veterinary services and housing;
- easy adaptation to captive state;
- ease of breeding in captivity;
- non-demanding husbandry;
- lack of public safety issues (disease transmission, aggressive behaviour);
- lack of objectionable characteristics such as vocalizations, odour (body odour, scent marking, enclosure odour) and property damaging behaviour (scratching, digging, scent marking, excretory habits, mating behaviour);
- life span not too long or too short.

In this section key criteria are assessed for each species in turn in summary form, with full details relating to the taxonomy, size, nutrition and health care of each focal species set out in Appendix F. Information presented here is gleaned from the literature and through consultations with keepers. For eastern quolls we rely substantially on Oakwood and Hopwood (1999), who conducted a survey of 20 scientists and wildlife carers with experience in handling and keeping quolls.

4.1.1 Eastern quoll

Diet and husbandry

All diet components for eastern quolls appear to be commercially available (Oakwood and Hopwood 1999). Appropriate products are available from Wombaroo Food Products,15 which is the only company to have entered the market of native mammal food products and equipment. All Oakwood and Hopwood’s (1999) survey respondents considered that quolls had simple housing requirements, with fixtures (nest boxes, feed and water devices) either commercially available or readily constructed from commercially available materials. The typical response was that quolls were ‘affordable’ to house. Several respondents allowed their pet quoll free run of the house and had therefore no cost of housing. Recommended enclosures require around 20 square metres (Jackson 2003). Quolls use latrines, so can be trained to use litter boxes (M. Archer, pers. comm.; Oakwood and Hopwood 1999), and faeces in enclosures are located in one place making them easy to clean (Jackson 2003). In Oakwood and Hopwood’s survey the mean time spent per day on daily maintenance of a quoll (feeding, watering, enclosure cleaning etc.) was 19 minutes and quolls were considered to be ‘occasionally’ or ‘rarely’ demanding on time by 90% of respondents.

Dasyurid joeys can be hand-reared using an artificial pouch with temperature monitoring. The composition of eastern quoll milk is known and there are several suitable low-lactose formulas. Very young joeys need feeding every two to three hours. Stress for joeys can be fatal and successful rearing requires keeping noise to a minimum, avoiding over-handling and maintaining high standards of hygiene (Bellamy 1994).

Health care and veterinary services

Eastern quolls are reported to suffer few health problems in captivity (see Appendix F for details). A significant issue relating to their being kept as pets is their susceptibility to toxoplasmosis, which is carried and spread by contact with domestic cat faeces (Holz 2008). This could raise significant problems for keeping as it would mean they would need to kept separated from cats and areas where cats defaecate. Eastern quolls in captivity are vulnerable to obesity as they tend to eat all food offered (Woolley 1982; Oakwood and Hopwood 1999; Jackson 2003; T. Evans and P. Mervin, pers. comm.). A further issue is the development of degenerative diseases, especially tumours, after two years of age,

15 http://www.wombaroo.com.au
with euthanasia commonly required (T. Evans, J. Little, pers. comm.). For example, of 118 animals kept in captivity at Mt Rothwell sanctuary, approximately 10 died from tumours (J. Little, pers. comm.). It is unknown whether this is a characteristic of the particular genetic stock currently represented in mainland populations, or whether such tumours could (as with some tumours of established domestic pets) be controlled with antibiotics.

There is currently no specific marsupial medication registered with the Australian Pesticides and Veterinary Medicines Authority (J. Sillince (PIAA), pers. comm.). Respondents to Oakwood and Hopwood’s (1999) survey considered that specialist attention was only occasionally required. If quolls became commercially available on a wider scale, it is likely that the veterinary industry would inform itself to fill the need, as has occurred for native and exotic birds and reptiles.

**Social and behavioural needs**

Being nocturnal, quolls tend to sleep during the day (thus being self-sufficient while the owner is away at work) and have been found to be active throughout the night in captivity. Many dasyurids are known to sun themselves during the day. They become active at or shortly after dark and remain active for an average of eight hours per night year-round despite the changing day length (Jones et al. 1997).

In the wild they are generally solitary and usually avoid each other, although their home ranges extensively overlap with each other (Jones 2008). They generally show aggression towards each other, with fighting intensity increasing with body size. Males have large home ranges and in the wild, may travel over a kilometre in a night. This could potentially present a concern for captive animals, although it should be noted both cats and dogs have large home ranges in the wild yet adapt readily to captivity. Females in the wild move only a few hundred metres around their dens and regularly share dens with males or other females, whereas males typically nest alone (Jones 2008). In captivity it has been suggested quolls should be kept in male/female pairs (Jackson 2003), although at Secret Creek Sanctuary eastern quolls are successfully kept in same-sex pairs, or in small family units during the breeding season (T. Evans, pers. comm.).

Holz (2008) notes that quolls are prone to stereotypic pacing and that it is important to provide behavioural enrichment such as interesting and varied enclosures, and different and varied feeding methods, including randomised feeding times. Enrichment can also be provided by varying the enclosure surfaces and varying and hiding food in order to increase foraging time (Jackson 2003).

**Adaptation to captivity and stress**

Quolls have been described very favourably as pets, with many keepers allowing them free run of the house in the evenings (Fleay 1945; Troughton 1954; Bonnin 1967; M. Archer, pers. comm.). 95% of Oakwood and Hopwood’s (1999) survey respondents reported that quolls ‘thrive in captivity’ or were ‘physically and psychologically healthy with occasional minor problems’. Keepers did not regard quolls as being prone to stress - all respondents noted that quolls ‘never, rarely or occasionally’ exhibited stress or fearful behaviour. However, it is frequently suggested that quolls are only suitable as pets when they are hand-raised (Oakwood & Hopwood 1999; T. Evans, pers. comm.).

Quolls are strong animals that can bite hard (Jackson 2003), although, as much smaller animals, they are clearly less dangerous to humans than most dogs. Most survey respondents ‘never or rarely’ experienced aggressive behaviour. Respondents who described quolls as ‘almost always’ aggressive referred to wild or caged quolls, whereas respondents that kept quolls as pets found them to be ‘never or rarely’ aggressive (Oakwood & Hopwood 1999). Where aggressive behaviour was experienced, its outcome was predominately described as ‘occasionally cause minor injury’ or ‘frequently cause injury’.

Quolls are agile and inquisitive creatures and good climbers. The majority of survey respondents experienced no property damage, or occasional minor damage. Dempster (1995) found that male captive northern quolls scent-mark more often than females, with sternal glands prominent in males but not in females.
When alone, quolls do not vocalise, but when in breeding colonies they vocalise nightly (T. Evans, pers. comm.). Jason and Rose (2001) also noted vocalizations during the breeding season, and Oakwood & Hopwood (1999) reported that never or rarely were vocalizations of sufficient loudness or duration to disturb a household.

**Potentially objectionable behaviours**

In captivity, eastern quolls show a number of scent-marking behaviours including deliberate defaecation and micturation; sterna, ventral and cloacal rubbing; and face washing (Bryant 1988; Croft 1982; Eisenberg and Golani 1977; Jones and Rose 2001). Quolls have a detectable but not an objectionable body odour (Oakwood & Hopwood 1999). If proper hygiene is maintained, enclosure odour can be kept to a minimum. Furthermore, quolls can be trained to use kitty litter.

**Life history, reproduction and captive breeding**

The life history and reproductive characteristics of eastern quolls are summarised in Table 4.1. A key point to note for the keeping of quolls as pets is their relatively short lifespan – in current captive colonies they typically die at around 3 years of age. It should be noted, however, that when animals do not breed they typically live around a year longer. As we propose that animals in private keeping be de-sexed (see section 4.2), such animals would be likely to have a lifespan of around 4 years.

The eastern quoll has been bred successfully in captivity and the species is considered suitable for establishment of a perpetual colony (Jackson 2003). The long-term viability of current captive populations remains unknown given limited genetic stock used. Zoos in the eastern states of Australia have traditionally concentrated on the eastern quoll. Breeding successes have occurred from time to time, as at Melbourne Zoo (from 1969-1976, with quolls from Tasmania), but zoos have not achieved any sustained breeding programs over the long-term. Colonies have been maintained for a few years at a time at the University of Tasmania and at Monash University (George 1990). Currently the main eastern quoll-breeding colony in Australia is at Secret Creek Sanctuary in NSW, which has bred approximately 400 animals since it was established nine years ago. This sanctuary is the main supplier of eastern quolls in Australia and maintains a genetic management program. In addition, at the Mt Rothwell Conservation and Research Centre in Victoria, 84 individuals have been released into the sanctuary and the current population estimate is 50-60 individuals (P. Mervin, pers. comm.). The Mainland Eastern Quoll Breeding Group (MEQBG) was recently established and aims to put in place a framework for breeding and genetic management to maintain wild-type genetics. Currently this group regularly exchanges animals to maintain the genetic health of captive populations (T. Evans, J. Little, pers. comm.).
Table 4.1 Eastern quoll reproduction and development

| Life span | Short life span (related to high metabolism) of 2-3 years (T. Evans, J. Little, P. Mervin, pers. comm.) and up to 4-5 years (Cronin 1991; Jones and Rose 2001; Jackson 2003). Of 118 animals bred at Mt Rothwell, only 1 male was reported to live to 4 years (J. Little, pers. comm.). Lack of breeding is reported to extend the life span of a hand-raised male by about 12 months or more (T. Evans, pers. comm.). |
| Sexual maturity | Independent at 6 months of age and sexually mature at 12 months. Could possibly be sold as pets from 3 months old (T. Evans, pers. comm.). |
| Oestrous | 34-37 day cycle; duration up to 5 days (behavioural oestrous 3 days); ovulation number 7-35; no delayed implantation (Jackson 2003); facultative polyoestrous (can undergo second oestrous if unmated or if prematurely lose the first litter). |
| Mating season | May-June; normally females produce one litter per year and reproduce twice in their lifetime (T. Evans, pers. comm.). |
| Gestation | 19-24 days |
| Litter | Birth of 8 young commonly, with 3-4 surviving (Jackson 2003). Litter size varies from 1-6 (mean is 6) with number decreasing with age of female (Jones and Rose 2001). Significantly more males are bred than females, with sometimes a sex ratio of 70:30 (T. Evans, pers. comm.). |
| Nursing and weaning | 6 nipples; young first detach after 49-65 days, permanently exit the pouch at 91 days, with weaning at 135-140 days (Jackson 2003). |
| Survival to maturity | Average 3-4 per litter (T. Evans, pers. comm.); 70% survival rate to first year (J. Little, pers. comm.). |

One issue with captive breeding of eastern quolls is that if a breeding season is missed, individuals typically do not recommence breeding (Jackson 2003). If a female fails to breed in the first year, there is only a 10% chance she will breed in subsequent years; if they do breed in the first year, females have a 60% chance of breeding in the second year (males 80% chance) (T. Evans, J. Little, pers. comm.) Therefore all attempts should be made to breed them in the first year to maximize reproductive output (Jackson 2003).

Knowledge of reproductive behaviour of eastern quolls (see also Appendix F) indicates the importance of specialist breeders. Some hand-raised quolls (male and female) have been found to fail to breed, suggesting that habituation with people can somehow exclude the mating instinct and that they need to be in at least a semi-wild state to be interested in seeking a mate (T. Evans, pers. comm.). Overweight males have been observed to lose interest in mating (T. Evans, pers. comm.). Castration can be done between 6-12 months of age (T. Evans, pers. comm.).

4.1.2 Mitchell’s hopping mouse

Diet and husbandry

Dietary requirements are similar to those of house mice and are easy to meet. Common mouse pellets are the main component, with some additional fresh fruits and vegetables.

Sufficient information exists regarding good husbandry of hopping mice as pets. (In South Australia, all species of hopping mice can already be legally kept as pets). In general, basic requirements are easy to meet and relatively similar to those required by house mice. They have simple housing requirements with appropriate fixtures (nest boxes, feed and water services) either commercially available or readily constructed from commercially available materials. They can be kept in an aquarium. Holding areas for Australian rodents can be very simple in design (see Appendix F for details), in most cases consisting of a simple enclosure with the walls and floor made of glass, tin or solid wood (Jackson 2003). Their typical rodent odour can be kept to a minimum if proper hygiene is maintained (Jackson 2003).
They can be handled easily, although they are fragile and should not be handled too frequently. Hopping mice should never be picked up by the tail, as the tail sheath is likely to slide off, resulting in that section of the tail drying out and dropping off (Jackson 2003).

If hand-rearing, native mice young (including Mitchell’s hopping mice) should be with a monitored heat pad set at 28-32°C. Hopping mice need to be fed 10-20% of their body mass per day with artificial formulas including Digestalact and Wombaroo dog milk replacer using an eyedropper, 1ml syringe or a catheter attached to a syringe (Jackson 2003).

Health care and veterinary services
Mitchell’s hopping mice are reported to suffer few health problems in captivity, providing they are kept under suitable conditions without overcrowding, which causes stress (see Appendix F).

Due to the few native mice in private hands, specialist advice on hopping mice is not currently widespread. However, native mice are from the Family Muridae, containing the house mouse, black rat and Norway rat, which are routinely held by members of the public and in scientific laboratories. There is therefore widespread relevant expertise that could be readily adapted. It is also likely that if Mitchell’s hopping mice became commercially available the veterinary industry would train itself to fill the need for specialist veterinary care, as has occurred for native and exotic birds and reptiles.

Social and behavioural needs
Hopping mice are social animals that typically live in small groups of up to four animals with one or more adult males and females. Breed & Ford (2007) observed eight Mitchell’s hopping mice occurring together within one burrow complex. They are strongly gregarious and exhibit a form of communal social organisation, although agonistic interactions do occur when strangers are first placed together (with more aggression between females than between males). Elements of agonistic behaviour rapidly diminish and individuals share the same nest within a day or two. Hopping mice exhibit much huddling behaviour and mutual grooming with all members of the same group recognising each other (Breed & Ford 2007). The suggested sex ratio in captivity is 1:1 (Happold 1976).

Mitchell’s hopping mice are nocturnal, with maximum activity in captivity being generally between 1900 and 2300 hours and least activity during the afternoon (1400–1700 hours) (Jackson 2003).

Although rodents generally suffer from few behavioural problems, enrichment can consist of variable enclosure surfaces, scattering food, providing running wheels, and changing rocks, grass tussocks and sticks (Jackson 2003).

Potentially objectionable behaviours
Hopping mice do not readily bite (Jackson 2003). They can be handled by small children with no risk of biting (Department of Education and Children’s Services 2008).

They have highly developed vocal communication although are not overly noisy in captivity (Watts 1981).

Life history, reproduction and captive breeding
Some of the following information refers to the more widely kept spinifex hopping mice, which is believed to be very similar in relevant respects to Mitchell’s hopping mouse. Spinifex hopping mice have been held in captivity as a laboratory animal since 1968 and subsequently have been held in various institutions, including Adelaide Zoo, Alice Springs Desert Park, Taronga Zoo and the Australian Wildlife Park (Jackson 2003). The Mitchell’s hopping mouse is similarly well suited to captivity and is being kept successfully by a number of private keepers in Victoria. Unlike many species of Australian rodents that breed poorly in successive generations in captivity, the Mitchell’s hopping mouse has been observed to breed well in captivity with no decline in population size after more than four years and after several generations (Watts 1973, 1980). Watts (1980) found that about
35% of wild-caught rodents bred in captivity, so it is important to obtain an adequate founding stock in order to develop a healthy population. Watts (1980) suggests that founding with at least eight individuals is important to maintain population size.

Care needs to be taken to prevent inbreeding depression, due to prolific breeding, and a considerably larger founding population size, or frequent immigration, will be required to avoid inbreeding.

Reproductive behaviour does not present challenges for the breeder or keeper (see Appendix F). Prevention of breeding of captive Australian rodents usually involves management of social groupings (separation of males and females) (Jackson 2003). Castration and ovariohysterectomy are both common surgical procedures performed on rodents (Vogelnest and Woods 2008). The risks associated with ovariohysterectomy are greater compared to castration, thus castration is the preferred technique to prevent breeding in rodents (Quesenberry and Carpenter 2004).

Table 4.2 Mitchell’s hopping mouse reproduction and development

<table>
<thead>
<tr>
<th>Life span</th>
<th>Up to 5 years in captivity (Breed and Ford 2008; Cronin 1991; Jones and Rose 2001).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual maturity</td>
<td>90 days once sexually mature; most rodents are sexually active for only 1-2 breeding seasons (Breed 1990b; Jackson 2003). Efficiency of sperm production is lower in hopping mice than in other rodent species due to smaller testis size (Breed and Ford 2007).</td>
</tr>
<tr>
<td>Mating season</td>
<td>Year-round under favourable conditions; spring and summer in wild populations (Breed and Ford 2007); birth season July-February (Breed 1990b; Jackson 2003); no evidence of seasonal breeding pattern in laboratory-kept animals (Watts and Aslin 1981).</td>
</tr>
<tr>
<td>Oestrous</td>
<td>Post-partum oestrus and can breed at least several times per year; environmental factors have been shown to influence reproduction in spinifex hopping mice (e.g. short photoperiod influences age of first oestrus and oestrus cycle (as does water deprivation) (Jackson 2003).</td>
</tr>
<tr>
<td>Gestation</td>
<td>34-42 days (Breed 1990b; Jackson 2003).</td>
</tr>
<tr>
<td>Average litter size</td>
<td>3-4 (Breed 1990b; Jackson 2003).</td>
</tr>
<tr>
<td>Nursing and weaning</td>
<td>4 nipples; weaning age 30-35 days; females leave pups in nest when foraging; some degree of paternal care in spinifex hopping mouse (Breed 1990b; Jackson 2003).</td>
</tr>
</tbody>
</table>

4.1.3 Summary: suitability of focal animals for keeping

1. Eastern quolls could potentially be suitable for private keeping, with some reservations. Most keepers are enthusiastic about their experience and report that they are engaging, attractive and interesting to keep, and can be kept with or without specialised enclosures and equipment. No major animal welfare issues appear to be raised by the keeping of eastern quolls, if keepers are well informed, have appropriate expertise, and are motivated to address quolls’ needs for adequate space, appropriate food and behavioural enrichment. While veterinary knowledge is currently inadequate, experience with exotic and native birds and reptiles suggests vets exposed to new species quickly acquire and share knowledge. While aggression and anti-social behaviours (scent-marking, chewing etc) occur to some extent, they appear at worst comparable to cats or dogs, and there would be little basis for restricting their keeping on these grounds.

2. However, there are some caveats. There are issues that could make quolls inappropriate as pets, including their short life span, which may make them unattractive to some keepers, and susceptibility to toxoplasmosis, which would preclude contact with domestic cats. Quolls may need to be hand-reared to make suitable pets, which alongside their slow rate of breeding could have implications for their financial viability. Low reproductive rates also mean that captive breeding colonies may not maintain viability over the long term. Eastern quolls may not be suitable for keeping as “pets” in the traditional sense (see section 1.5). Two of the most experienced eastern quoll breeders remain doubtful about their suitability for keeping by the general public (T. Evans and J. Little (private keepers), pers. comm.), pointing out that knowledge
of their husbandry needs is not complete. Quolls may well be more suitable as animals kept under
the “animal-keeping” model, with keeping restricted to those who can demonstrate appropriate
specialist skills and experience.

3. From an attractiveness, animal welfare and public health perspective Mitchell’s hopping mouse
appears highly suitable as a pet. It is easily managed in captivity, where it breeds prolifically with
low husbandry costs. Rodents are already widely kept as household pets, and private keepers in
Victoria are keeping Mitchell’s hopping mouse successfully.

4.1.4 Recommendations: suitability of focal animals for keeping

From an animal welfare and public health perspective eastern quolls appear potentially suitable for
private keeping, although possibly not as traditional “pets”. As long as keepers are well educated and
have appropriate skills, no major welfare or husbandry issues are raised. However, eastern quolls’
susceptibility to toxoplasmosis, relatively short lifespan, low reproductive rate and potentially high
cost may raise issues around market demand and financial viability. These issues are addressed further
below.

Mitchell’s hopping mouse is a suitable species for widespread keeping as a pet.

4.2 Making the industry work for conservation and animal welfare

The proposition of more widespread native mammal keeping raises both opportunities and threats for
conservation. The major arguments and their potential implications for the focal species have been
outlined in Chapter 2 – in this section we draw on this analysis to examine what actions could be taken
both to realise, where possible, potential conservation benefits of more widespread keeping, and to
avoid or reduce the potential harm. To allow easy comparison of these actions and their relationship to
the issues identified in Chapter 2, a summary of the relationship is presented in Table 4.3.
Table 4.3. Comparison of potential conservation/welfare actions associated with keeping eastern quolls and Mitchell’s hopping mice as pets, and the risks/benefits they address

<table>
<thead>
<tr>
<th>Benefit/Risk</th>
<th>Actions To Maximise Benefit/Minimise Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced keeping of exotic species as pets</td>
<td>Expanded range of native mammals able to be kept</td>
</tr>
<tr>
<td></td>
<td>Education/awareness on “wildlife keeping” option</td>
</tr>
<tr>
<td>Safeguarding and expanding threatened populations</td>
<td>Expanding numbers in captivity and number of separate populations kept</td>
</tr>
<tr>
<td></td>
<td>Conservation-oriented genetic management, including studbook management</td>
</tr>
<tr>
<td></td>
<td>National register and record-keeping</td>
</tr>
<tr>
<td></td>
<td>Involvement of private landholders interested in reintroduction</td>
</tr>
<tr>
<td>Increased knowledge of native mammal husbandry and ecology</td>
<td>Expanding numbers being kept and the numbers of keepers</td>
</tr>
<tr>
<td></td>
<td>Supporting information sharing, especially relating to husbandry techniques</td>
</tr>
<tr>
<td></td>
<td>Consultation with local Aboriginal people</td>
</tr>
<tr>
<td>Generation of funds for conservation benefit</td>
<td>Enabling conservation breeders to sell surplus animals as pets to raise funds for conservation activities</td>
</tr>
<tr>
<td></td>
<td>Motivating investment in captive breeding</td>
</tr>
<tr>
<td></td>
<td>Conservation levy or conservation charge - funds returned to conservation program</td>
</tr>
<tr>
<td>Increasing public awareness of the existence and needs of native wildlife</td>
<td>Expanding numbers of people able to keep and care for native mammals – “Conservation Keepers”</td>
</tr>
<tr>
<td></td>
<td>Education in schools</td>
</tr>
<tr>
<td></td>
<td>Public awareness campaigns</td>
</tr>
<tr>
<td>Compromised animal welfare</td>
<td>Model code of practice with mandatory compliance</td>
</tr>
<tr>
<td></td>
<td>Licence classes (e.g. specialist expertise required for quolls)</td>
</tr>
<tr>
<td>Escape or release of captive-bred animals into the wild</td>
<td>Micro-chipping of animals prior to sale</td>
</tr>
<tr>
<td></td>
<td>National register and record-keeping</td>
</tr>
<tr>
<td></td>
<td>Penalties for unlawful actions</td>
</tr>
<tr>
<td>Loss of “wild-type” genetics e.g. in-breeding depression; selective breeding of unnatural colour morphs and sizes</td>
<td>Limiting breeding concern to small number of establishments through mandatory de-sexing of animals in private keeping</td>
</tr>
<tr>
<td></td>
<td>Conservation-oriented genetic management including studbooks</td>
</tr>
<tr>
<td>Illegal harvesting and trade</td>
<td>Compulsory micro-chipping</td>
</tr>
<tr>
<td></td>
<td>National register and record-keeping</td>
</tr>
<tr>
<td></td>
<td>Expanding captive bred populations, making illegal harvest less attractive</td>
</tr>
<tr>
<td></td>
<td>Penalties for unlawful actions</td>
</tr>
</tbody>
</table>

4.2.1 Identification, registration and record-keeping

A permanent identification, registration and record-keeping scheme could be established for some, or all, native mammals kept as pets. Such a scheme would require that breeders and/or keepers permanently mark all animals; keep records of all breeding events, sales and other transfers; and lodge these records with an appropriate registry. Identification and registration establishes the link between an animal and its keeper, meaning the keeper can be held accountable for offences relating to the animal, including escapes/releases. It provides a means of verifying an animal’s origin to establish whether it has come from a legitimate source, helping address illegal harvest and trade. It enables monitoring of the numbers of animals kept and the movement of animals, allowing detection of data inconsistencies that could indicate noncompliance with regulations and tracking of trends in the industry that could affect conservation or other outcomes.

The effectiveness of such a system in achieving these outcomes will rely on good communication systems and information management, and nation-wide sharing of statistics through integrated databases (H. Dridan (Investigation and Compliance Unit, SA Department of Environment and...
Currently a variety of state and nationwide pet registers operate, which can cause some difficulties, although all are required to share information. A central nationwide registry licensed by governments to provide these services could be likely to function most efficiently for native pets, as the low number of breeders (at least initially) means that animals would be likely to cross borders frequently.

To track the origin and movement in Australia of exotic (non-native) birds (particularly species with a high risk of illegal trade), the Exotic Bird Record Keeping Scheme was introduced in December 2007 as a government initiative. The scheme’s strategy to attract participants is to use the principle of “reverse onus of responsibility” where buyers take responsibility for ensuring, and being able to prove, the legality of birds they keep, breed or trade. The Exotic Bird Record Keeping Scheme is a voluntary scheme to enable them to do this. Key elements of the scheme are individual identification of birds, and record-keeping for all activities (such as births and deaths) and movement transactions. An evaluation of the scheme in February 2009 concluded that it was too early to judge whether the scheme has been successful in reducing illegal trade. If the scheme proves successful in mitigating illegal trade in exotic birds, this would be a strong argument for a similar (voluntary or compulsory) scheme for at least some native mammal pets.

For mammals, microchipping represents the most appropriate means of permanent identification. This could be required at point of sale, change of ownership or by a set age (or by whichever occurs first). Microchipping for pets is not compulsory in any jurisdiction to date. Tattooing can additionally be used to identify animals that have been de-sexed (see more on de-sexing below).

4.2.2 Captive breeding

It is assumed in this discussion that native mammals kept as pets will originate from captive-bred sources only. For eastern quolls, the small wild population necessitates this. For Mitchell’s hopping mouse, which can be locally common, captive breeding enables easier monitoring and control of breeding stocks, and control of illegal harvesting. Captive breeding can be managed and/or regulated in a number of ways in order to support conservation outcomes from mammal-keeping.

Genetic management

Genetic management of captive populations will be necessary for some species at least in order to conserve wild-type genes, to maintain genetic health of captive populations (e.g. avoid inbreeding and outbreeding depression), and avoid directional selection for unusual or exaggerated features (both to protect wild populations from genetic incursions should any captive-bred animals escape, and for potential intended reintroductions to the wild). This may include determining relatedness of founder individuals for captive breeding colonies, and introducing new individuals from wild populations on a regular basis to ensure sufficient genetic variability in breeding colonies to prevent inbreeding (Bradley et al. 1999).

Careful genetic management is particularly important for species of conservation concern, such as the eastern quoll. Hopwood (2002) suggests that commercial breeding facilities for threatened species should be required to maintain a breeding nucleus of genetically wild-type animals, with a separate strain of animals that provides animals for the pet industry. Another, and potentially less complex and more precautionary, option is that for species of conservation only the wild-type genetic strain is maintained – the entire captive population is managed to maintain wild-type genetics. This approach would maximise the potential contribution of the captive population to species conservation, including the potential for reintroduction. For eastern quolls, all breeding should be managed within a single coordinated conservation framework, and carried out by a limited number of reputable institutions with appropriate expertise (see below). For the eastern quoll the framework should build on the already established Mainland Eastern Quoll Breeding Group (MEQBG), whose focus is to maintain...
the genetic health of captive populations through mechanisms such as transferring animals between breeding groups.

The Australasian Species Management Program (ASMP) (see Appendix E) of the Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA) could potentially also play a role. The ASMP manages animal collections cooperatively to promote sustainability and contribute to species conservation. For many species they maintain studbooks, which catalogue individuals in the population, recording their origins, parentage, and life history details. Currently there are no studbooks for eastern quoll or Mitchell’s hopping mouse (there are studbooks for spotted-tailed quoll at Adelaide Zoo, and northern quoll). An eastern quoll studbook could be established and maintained by the MEQBG, with advice from ARAZPA and academic experts on the establishment of a breeding management plan. The studbook should be public domain and maintained on a public website to ensure transparency and allow opportunity for comment by experts and government and non-government organisations. The zoo industry standard for studbook management is the SPARKS (Single Population Analysis & Records Keeping System) computer program for population management. This can determine appropriate pairings and breeding strategies to minimise problems with bottlenecks, inbreeding and loss of biodiversity.

For species of conservation “least concern”, such as Mitchell’s hopping mouse, breeding restrictions can be more relaxed. Government oversight of genetic management of the captive stock is not required for hopping mice in jurisdictions where they are currently legally kept, and it would be hard to justify just a requirement on conservation grounds.

**Production of animals for sale**

Currently, most or all captive eastern quolls are being bred by conservation-oriented organisations. These organisations could sell a sub-set of animals as pets, providing an additional revenue stream for their conservation activities. In current eastern quoll breeding programs (e.g. Secret Creek Sanctuary), excess males are produced which do not contribute to the expansion of captive populations, as males are capable of inseminating many females. These males would be appropriate for selling into the pet market. Given the paucity of public and private funding available for captive breeding activities (funding widely viewed as in decline), this revenue stream could provide much-needed income for the activities of such organisations, including captive breeding and reintroduction efforts. This would mean the mammal-keeping industry was directly supporting conservation outcomes. However, breeding need not be restricted to established conservation organisations. Commercial breeders seeking to supply the pet market should be allowed to do so, as long as they can demonstrate they have appropriate expertise and will participate in the conservation-breeding framework established by the MEQBG. If following appropriate protocols, all breeders would be contributing to the long-term survival of the eastern quoll by boosting the numbers in captivity, safeguarding their resilience against e.g. disease by establishing multiple colonies, and maintaining genetic diversity of the captive population.

For Mitchell’s hopping mice, commercial breeding and sale is allowed in each of the jurisdictions where they can be privately kept, and this practice could be expanded if keeping of this species was more widely accepted.

**Regulation of breeders**

For species of high conservation concern such as eastern quolls, the conservation relevance of breeding can be maintained by restricting their breeding only to licensed breeders (see below). Licensed breeders would be required to demonstrate appropriate expertise, and that they are following appropriate breeding protocols and accurately maintaining the studbook. While it is unlikely that ARAZPA would be involved in a venture that bred and sold animals purely for the purpose of the pet trade, if use of native mammals as pets was undertaken under a framework of breeding by specialists for conservation purposes, ARAZPA could potentially be involved (Paul Andrew (ARAZPA), pers. comm.). However, given the considerable success of private keepers in breeding some bird and reptile
species of conservation concern, it is important that the role of breeding for conservation is not restricted to ARAZPA.

**De-sexing of animals in private keeping**

For species of high conservation concern such as eastern quolls, a range of conservation and welfare issues could be effectively addressed by restricting breeding of animals to a small number of establishments with sound conservation credentials, which could be ensured through inspections, licensing, accreditation or some other system. Animals in private keeping would then be required to be de-sexed. While this approach would be likely to be unpopular among native animal enthusiasts keen to watch and understand reproductive behaviours, it would be a very effective means to address several of the most important potential conservation issues. This approach would ensure that the conservation-focused management of current captive colonies is not undermined by poorly coordinated or commercially-driven breeding, such as for particular colour morphs or behavioural attributes attractive to keepers, and that all breeding was appropriate for maintaining wild-type genetics and genetic health. It would also vastly reduce the potential for escapes/releases to impact on wild populations. Those who wish to contribute to conservation efforts, and had the appropriate expertise and facilities to do so, could seek appropriate licensing for breeding in cooperation with the conservation-breeding network.

Ideally, de-sexing would be required before animals leave the hands of breeders to reduce the chances for unauthorised breeding. However, the appropriate age for de-sexing is 6-12 months for eastern quolls (T. Evans, pers. comm.), while weaning takes place from 3 months, meaning sale is possible from this point. It may be impractical to require that breeders retain animals until they are of an appropriate age to de-sex. Alternatively, keepers could be required to demonstrate de-sexing requirements had been fulfilled as a licence condition.

For species of much lower conservation concern such as Mitchell’s hopping mouse, these measures are not warranted. However, separation of males and females is generally advisable.

**Reintroductions and involvement of private landholders**

Expanding populations in captivity of threatened species and those that have disappeared from parts of their range could support efforts to reintroduce these species into the wild. Reintroduction of eastern quolls into the wild is an eventual aim of the Mainland Eastern Quoll Breeding Group (MEQBG), under a carefully managed strategy. While Mitchell’s hopping mouse is still well-established across much of its former range it too could be reintroduced as part of biodiversity reconstruction efforts. The involvement of private landholders and farmers is well worth exploring in this context. The report of the House of Representatives Standing Committee on Environment and Heritage’s (2001) Inquiry into Public Good Conservation highlighted the willingness of farmers to engage with such ventures, provided that it does not impose a financial burden. The inquiry also noted the need for new industries to be developed and new markets created based on ecologically sustainable use of land and wildlife.

**4.2.3 Licensing**

Keepers and breeders of native mammals should be required to hold a licence, as occurs now in those states where a wide range of native mammals are kept. Requiring prospective keepers of the eastern quoll and Mitchell’s hopping mouse to obtain a licence would help support animal welfare and conservation outcomes through enabling relevant government departments to:

- consider licence applications based on merits such as the requisite skills to care for wildlife effectively, potentially requiring that a test of husbandry knowledge is passed;
- establish licence classes appropriate for the particular species e.g. ‘basic’ for Mitchell’s hopping mouse and ‘special’ or ‘advanced’ for eastern quoll;
- deny licences to individuals previously convicted of wildlife-related offences;
- monitor and track the level of keeping of each species, which could serve as early warning of levels of demand for certain species that could trigger concerns regarding the potential for illegal harvest/trade (this would depend on regular review of such statistics by regulatory agencies);
• have some control over breeding through establishing licence conditions preventing hybridisation and directional breeding for unusual or exaggerated characteristics.

As is the case now in various jurisdictions, commercial trade of native mammals could be enabled under the same licence used to authorise private keeping (as in the NT), or by a separate licence issued more restrictively (as in SA and Victoria).

As outlined above, for species of conservation concern such as eastern quoll it would be appropriate to restrict breeding to authorised individuals. This could be provided for in the licensing system by imposing appropriate licence conditions. For these species, licences authorising keeping/trading could require de-sexing and tattooing (to identify as de-sexed), unless the licence holder has received authorisation as a breeder. Applications for authorisation to breed animals should be supported by information on facilities and prior experience and management, and licence conditions should include participation in the appropriate conservation breeding network and adherence to all requirements for identification and registration. Continued issuing and renewal of authorisation to breed should be dependent on proper maintenance of the studbook and adherence to a coordinated breeding plan that ensures maintenance of wild-type genetics.

As conservation issues are of primary importance in regulation of keeping of species of conservation concern, state conservation agencies should administer and oversee the licensing system at least for these species, although for breeding and trade of species where significant conservation are not raised, it may be that a department oriented toward commercial activities may be more appropriate. This would echo aspects of the current situation in some jurisdictions, such as NSW, where the Department of the Environment, Climate Change and Water (DECCW) has responsibility for licensing keeping of native species for some purposes, such as conservation breeding, but the Department of Primary Industries licenses keeping for commercial purposes (exhibition)18.

Expansion of native animal keeping to a wider range of species would increase the administrative burden on government environment agencies, unless they relaxed licensing requirements on some species (such as by adding them to exempt lists), or shifted administration to a different department or even (like dogs and cats) to local government. Government licensing and enforcement costs may be reflected in increased licensing fees.

4.2.4 Generating funds for conservation

Funds could be generated for the conservation of wild populations by an added cost to the licence fee or the retail cost of the animal (therefore paid by the owner of the animal), or by charging an industry levy (therefore paid by the breeder or trader). Industry levies are commonplace in many industries in Australia (e.g. dairy, grain, horticulture, livestock and wine). The general process for the initiation of a levy is for an industry body to identify the need for a levy or charge to respond to a problem or opportunity requiring collective industry funding. After consultation with its members and other stakeholders, the industry body submits a proposal to the Commonwealth government, which upon approval, drafts legislation to implement the levy19. Levies are collected and disbursed to relevant organisations by the Levies Revenue Service (LRS), an organisation within the Department of Agriculture, Fisheries and Forestry (DAFF). The fee to the owner could either be a fixed price depending on the species or calculated as a percentage of the sale price. Revenue could be used to fund relevant conservation, research or education programs. Enabling conservation-oriented breeders to sell surplus animals as pets to raise funds for conservation activities is another mechanism. There is no obvious reason that this should not work for eastern quolls, although much will depend on the economics of the industry (see below).

---

18 In NSW note, however, that DECCW has responsibility for licensing of all animals kept as pets.
4.2.5 Public education

If keeping of native animals is to contribute to public awareness of threatened species, the threats they face, and the need to support their conservation, animal keeping should be accompanied by a range of strategies to raise awareness and knowledge. These could be adopted and promoted where appropriate by breeders, the pet industry, and/or regulators. The keeping of native animals could be presented to people as, for instance, “Conservation Keeping” – mandatory information supplied with the animal (see section 4.3.5 below) could inform people about the species and its conservation, the fact that a proportion of their purchase price is going toward conservation projects, and the range of activities the keeper can participate in to assist conservation. Encouraging the keeping of native rather than exotic pets by schools, accompanied by education about the animals, their habitats and their conservation, could effectively reach a very wide audience through a small number of animals. Keepers could be actively encouraged to join specialist keeper societies such as the Marsupial Societies of Australia and Victoria, which could inform and educate their members and encourage relevant conservation activities. Revenue generated from licensing of keeping wildlife (as above) or from the conservation levy could be used to fund relevant education and awareness programs.

4.2.6 Codes of practice for animal welfare

Awareness and implementation of strict animal welfare standards will be a critical element. A model code of practice for native mammal keeping should be developed, using as a basis the draft Victorian Code of Practice for the Private Keeping of Australian Mammals. The code could be provided to every purchaser of a native mammal and/or form the basis of testing to gain specialist keepers’ licences. Compliance with the code would be an appropriate licence condition. Within the pet industry, including pet stores, the established pet industry codes of practice for responsible selling of pets (see Appendix B, Table B2), with their enforcement mechanisms, would apply to selling of native animals also.

4.2.7 Summary: making the industry work for conservation and animal welfare

1. A permanent identification (e.g. microchipping), registration and record-keeping scheme for some species would enable keepers to be held accountable for offences relating to animals, including escapes/releases; allows verification of animal origins and therefore assists in controlling illegal harvest/trade, and enables monitoring of keeping and detection of potentially problematic trends.
2. Coordinated, scientifically-based genetic management of captive populations of some species would enable conservation of wild-type genes, maintenance of genetic health (e.g. avoiding inbreeding or outbreeding depression), and avoidance of directional selection in response to commercial pressures (e.g. for unusual characteristics, colour morphs, or docility).
3. Current eastern quoll breeders may be able to sell surplus animals (e.g. males) to raise money for their captive breeding and conservation activities.
4. Breeding of some species could be restricted to licensed breeders who can demonstrate appropriate skills and expertise, with mandatory de-sexing of animals in private keeping. This would ensure that conservation-focused management of captive colonies is not undermined by poorly coordinated or commercially driven breeding, and that all breeding is appropriate to maintain wild-type genetics and genetic health. It would also vastly reduce the potential for escape/releases to impact on wild populations, as individual escapees could not breed with wild populations or establish feral populations.
5. Licensing of keeping can restrict keeping and/or breeding to those who can demonstrate awareness of appropriate husbandry and animal welfare requirements, and can involve different licences (e.g. basic vs specialist) for species requiring different levels of skill and expertise.
6. A conservation levy on breeders/traders or a conservation charge on keepers could raise funding to be returned to appropriate conservation projects.
7. A range of public education and awareness measures could ensure wider native mammal-keeping was accompanied by wider understanding and awareness of native species, the threats facing them in the wild, the need for conservation measures and the ways in which the public can contribute.
8. Development of appropriate codes of practice for keeping native mammals in all jurisdictions that allow their keeping could contribute significantly to ensuring wide understanding of animal welfare and husbandry requirements among keepers.

4.2.8 Conclusion: making the industry work for conservation and animal welfare

A range of regulatory, educational, and industry structure measures could be used to address the various conservation and animal welfare threats raised by wider mammal-keeping, and to maximise the potential industry contribution to conservation.

4.3 Addressing industry practicalities

4.3.1 Market demand for native pets

This section considers the current market for both native animals and exotic pets in Australia, and explores implications for the economic feasibility of an industry based on native mammal keeping in a manner supporting conservation outcomes.

The number of exotic pets currently kept in Australia is more than 37 million, and the pet industry is one of the largest industries in Australia, contributing around $4.74 billion annually to the Australian economy and employing over 44 700 people (BIS Shrapnel 2006). Australia has the highest rate of pet ownership in the world, with approximately two-thirds of households owning a pet.

Dogs and cats remain among the most popular household pets, although the Australian Companion Animal Council (2009) reports that their populations have been steadily declining over the past ten years. Unsuitable accommodation, such as rental properties or accommodation without outdoor living space, and lack of anyone at home to care for a pet have been identified as key reasons for not owning a pet (McHarg et al. 1995). Today’s increase in high-density living, and changing lifestyles with people working long hours and more single-person homes, could also be factors in decreasing dog and cat ownership. At the same time, however, the market for reptiles has increased in recent years with 200 native reptiles being sold every week throughout Australia in 2006 (BIS Shrapnel 2006). Reptiles make suitable pets for apartment dwellers and require little attention, making them a popular alternative to more traditional pets such as dogs and cats. In NSW the number of registered keepers of native reptiles rose from negligible numbers to 8 000 (which may also reflect illegal holdings being recorded for the first time), after a change in the licensing system allowed the keeping of more varieties of native reptiles under a licence (BIS Shrapnel 2006).

The private keeping of native animals in Australia (apart from a small number of “traditional” species, including birds such as budgerigars and cockatiels) is relatively new and quite limited, so the current market share and economic benefits have not been quantified in any systematic way. Anecdotally, however, there has been ongoing interest over a long period of time in the keeping of native mammals as pets (J. Sillince (PIAA), pers. comm.). Forums for keeper associations such as the Marsupial Society of Australia20 and the Marsupial Society of Victoria21 have many members seeking to obtain native mammals as pets and sharing their experiences. This interest is borne out by examination of the numbers of licences issued for native animals. In 2005, the number of private licences and permits issued for the keeping of native fauna was approximately 44 851 (Table 4.4). More than one animal can be kept under the same licence or permit, with the number of native fauna kept under licence estimated to be roughly 224 000 (BIS Shrapnel 2006). As this number does not include any native fauna that are exempt from licensing requirements, these figures underestimate the actual numbers kept (although underestimation will be much less for mammals than for the taxa featuring more widely on exempt lists, such as birds).

20 www.marsupialsociety.org
21 http://mc2.vicnet.net.au/home/msov/web/indexfront.html
A key point illustrated by this table is the underrepresentation of mammals – only around 1% of licences and permits issued relate to mammals. By contrast, over 50% of the licenses and permits issued are for reptiles. Given the popularity of mammals as pets generally it is likely that the restrictive nature of the licensing regime for native mammals as pets is responsible for the low numbers of native mammals kept, and that there would be considerable interest in more widespread mammal keeping should it be allowed.

This is supported by closer examination of the situation in SA and Victoria, where regulations for native mammal keeping are relatively permissive (Tables 4.5, 4.6). The number of mammals kept clearly demonstrates a significant level of interest. In SA alone, for instance, there were 5 479 mammals kept under private keepers’ licences in 2009 (Table 4.5). A wide variety of mammals are kept (Table 4.6), with the most popular including several wallaby, kangaroo and bettong species, and sugar gliders. Two eastern quolls were kept under licence in SA (and none in Victoria, which does not permit their keeping (see Table 3.3)). Four Mitchell’s hopping-mice were kept in SA and 391 in Victoria.

Table 4.5 Number of native birds, mammals, reptiles and amphibians kept under private keepers licences (Basic and Advanced) in SA and Victoria in 2009

<table>
<thead>
<tr>
<th></th>
<th>SA</th>
<th>Victoria</th>
</tr>
</thead>
<tbody>
<tr>
<td>birds</td>
<td>13 239</td>
<td>25 168</td>
</tr>
<tr>
<td>mammals</td>
<td>5 479</td>
<td>1 691</td>
</tr>
<tr>
<td>reptiles</td>
<td>7 357</td>
<td>21 633</td>
</tr>
<tr>
<td>amphibians</td>
<td>0</td>
<td>5 939</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26 075</strong></td>
<td><strong>54 431</strong></td>
</tr>
</tbody>
</table>

Note: Numbers are current for SA in November 2009 and for Victoria in June 2009; number of licences is the same as the number of licence-holders, as only one licence is issued per person regardless of numbers of animals kept.

Sources: SA Department for Environment and Heritage – Fauna Permits Unit; Victoria Department of Sustainability and Environment – Wildlife and Game Licensing
Table 4.6 Number of native mammals kept under private keepers licences (Basic and Advanced) in SA and Victoria in 2009

<table>
<thead>
<tr>
<th>Species</th>
<th>SA</th>
<th>Vic</th>
<th>SA</th>
<th>Vic</th>
</tr>
</thead>
<tbody>
<tr>
<td>tammar wallaby</td>
<td>760</td>
<td>260</td>
<td>koala</td>
<td>41</td>
</tr>
<tr>
<td>brush-tailed bettong</td>
<td>661</td>
<td>17</td>
<td>common wombat</td>
<td>36</td>
</tr>
<tr>
<td>western grey kangaroo</td>
<td>641</td>
<td>9</td>
<td>numbkat</td>
<td>35</td>
</tr>
<tr>
<td>rufous bettong</td>
<td>520</td>
<td>26</td>
<td>agile wallaby</td>
<td>35</td>
</tr>
<tr>
<td>red kangaroo</td>
<td>482</td>
<td>7</td>
<td>platypus</td>
<td>32</td>
</tr>
<tr>
<td>long-nosed potoroo</td>
<td>323</td>
<td>3</td>
<td>grey-headed flying-fox</td>
<td>21</td>
</tr>
<tr>
<td>red-necked wallaby</td>
<td>217</td>
<td>172</td>
<td>brush-tailed rock-wallaby</td>
<td>18</td>
</tr>
<tr>
<td>squirrel glider</td>
<td>175</td>
<td>0</td>
<td>short-beaked echidna</td>
<td>17</td>
</tr>
<tr>
<td>southern brown bandicoot</td>
<td>175</td>
<td>0</td>
<td>Tasmanian pademelon</td>
<td>16</td>
</tr>
<tr>
<td>sugar glider</td>
<td>168</td>
<td>502</td>
<td>spotted-tailed quoll</td>
<td>12</td>
</tr>
<tr>
<td>eastern grey kangaroo</td>
<td>157</td>
<td>26</td>
<td>greater stick-nest rat</td>
<td>8</td>
</tr>
<tr>
<td>swamp wallaby</td>
<td>149</td>
<td>46</td>
<td>Tasmanian devil</td>
<td>6</td>
</tr>
<tr>
<td>parma wallaby</td>
<td>131</td>
<td>n/a</td>
<td>feathertail glider</td>
<td>6</td>
</tr>
<tr>
<td>euro/common wallaroo</td>
<td>94</td>
<td>0</td>
<td>tasmanian bettong</td>
<td>4</td>
</tr>
<tr>
<td>burrowing bettong</td>
<td>90</td>
<td>n/a</td>
<td>Mitchell’s hopping-mouse</td>
<td>4</td>
</tr>
<tr>
<td>fat-tailed dunnart</td>
<td>88</td>
<td>49</td>
<td>eastern quoll</td>
<td>2</td>
</tr>
<tr>
<td>bilby</td>
<td>85</td>
<td>n/a</td>
<td>northern brown bandicoot</td>
<td>2</td>
</tr>
<tr>
<td>common ringtail possum</td>
<td>82</td>
<td>91</td>
<td>spectecled flying-fox</td>
<td>2</td>
</tr>
<tr>
<td>red-necked pademelon</td>
<td>73</td>
<td>0</td>
<td>northern brushtail possum</td>
<td>1</td>
</tr>
<tr>
<td>common brushtail possum</td>
<td>54</td>
<td>15</td>
<td>Gould’s long-eared bat</td>
<td>1</td>
</tr>
<tr>
<td>southern hairy-nosed wombat</td>
<td>54</td>
<td>n/a</td>
<td>broad-faced potoroo</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5 479</strong></td>
<td><strong>1 691</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Numbers are current for SA in November 2009 and for Victoria in June 2009; n/a indicates this species cannot be privately kept in that state.

Sources: SA Department for Environment and Heritage - Fauna Permits Unit; Victoria Department of Sustainability and Environment – Wildlife and Game Licensing

Other countries have (for better or worse) been faster in taking up market potential. Over the past 20 years, sugar gliders have taken the pet market by storm in the United States, and internet searching reveals many American sugar glider societies, support organisations and retailers (see Archer and Beale 2004). In the United States and Canada, red and grey kangaroos are bred for pets and for sale to zoos and wildlife parks. Some species of wallaby are legally exported from New Zealand and sold as pets in the US, Greece and Japan. 22

4.3.2 Sourcing breeding stock

Expansion of an industry based on native mammals would require that breeders were able to source animals of appropriate provenance for establishment of breeding colonies. Options include wild harvest, or captive or free ranging colonies held by zoos, wildlife sanctuaries or individuals. There are no commercial breeding facilities for either the eastern quoll or Mitchell’s hopping mouse in Australia. For eastern quolls, Secret Creek Sanctuary has bred most of the current mainland population and distributed them to other sanctuaries and wildlife parks, where some breeding occurs (e.g. Featherdale Wildlife Park (NSW); Pearcedale Conservation Park, Healesville Sanctuary and Mt Rothwell Sanctuary (Victoria); Gorge Wildlife Park (SA); Zoodoo Wildlife Park (Tasmania)), but breeding is mostly incidental with very few facilities actively managing eastern quolls as a breeding population. Most facilities report that they rarely have excess stock and exchange any surplus animals with other licensed facilities rather than selling them to private keepers (T. Evans, P. Mervin, M. Johnson, L. Chivers, S. McKechnie, pers. comm.). As a result, it may be difficult for prospective breeders to source stock. For Mitchell’s hopping mouse, the relative ease of acquiring animals from private keepers means this is unlikely to pose a barrier.

For species of conservation concern, appropriate genetic provenance of breeding colonies is an important concern. For most of these species, including eastern quoll, this is likely to require some level of take from the wild to ensure good representation of wild-type genetics. This will require securing permission from state regulators for such take, which from a business perspective will introduce a level of uncertainty into the process of establishing breeding colonies. If state agencies are supportive of the concept of expanding a pet industry with a conservation focus, however, they may be supportive of the establishment of breeding colonies and willing to give such permissions for a low level of (perhaps only initial) harvest to establish or maintain appropriate genetic representation.

4.3.3 Financial costs for breeders and keepers

As with all industries, there are public sector costs associated with a native mammal pet industry. Government financial burdens will include the cost of administering the licence system, monitoring and enforcement. The industry will be expected to carry at least part of these costs through licence fees, and must further bear the costs of compliance with bureaucratic requirements. An important success factor for a native pet industry will be to ensure that the regulatory burden is closely geared toward conservation needs and is not excessive.

For animal keepers, costs associated with the care of native mammals as pets would be comparable with pets in general, which includes pet food, various pet products and services as well as veterinary services. With pet purchases only making up 6.5% of total expenditure, the majority of expenditure is on pet food (43.5%) and veterinary charges (23.2%) (Table 4.7). Keeping quolls does not appear to involve heavy financial outlays. In Oakwood and Hopwood’s (1999) survey, respondents reported that costs associated with keeping quolls (other than food and housing) were ‘affordable’ or ‘cheap’, with the average calculated at $120 per annum. The mean cost of feeding a quoll was estimated at between $5.20-$7.17 per week (Oakwood and Hopwood 1999). At Mt Rothwell Earth Sanctuaries, the cost of feeding 36 eastern quolls and 12 spotted-tailed quolls is estimated at $600-$800/week, averaging $14.60/animal/week) (P. Mervin (keeper), pers. comm.). For Mitchell’s hopping mouse, according to both private and commercial breeders, the cost of feeding and housing is low, and no more than any other rodent.

Table 4.7 Expenditure on pet care in Australia, 2005 ($ million)

<table>
<thead>
<tr>
<th>Expenditure type</th>
<th>Dogs</th>
<th>Cats</th>
<th>Other pets</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>food:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>manufactured</td>
<td>865</td>
<td>490</td>
<td>156</td>
<td>1,511</td>
</tr>
<tr>
<td>non-manufactured</td>
<td>300</td>
<td>200</td>
<td>-</td>
<td>500</td>
</tr>
<tr>
<td>Subtotal</td>
<td>1,165</td>
<td>690</td>
<td>156</td>
<td>2,011</td>
</tr>
<tr>
<td>veterinary charges</td>
<td>700</td>
<td>240</td>
<td>125</td>
<td>1,065</td>
</tr>
<tr>
<td>products &amp; equipment</td>
<td>220</td>
<td>95</td>
<td>225</td>
<td>540</td>
</tr>
<tr>
<td>services</td>
<td>395</td>
<td>135</td>
<td>-</td>
<td>530</td>
</tr>
<tr>
<td>pet purchases</td>
<td>110</td>
<td>23</td>
<td>162</td>
<td>295</td>
</tr>
<tr>
<td>other expenses</td>
<td>155</td>
<td>12</td>
<td>12</td>
<td>179</td>
</tr>
<tr>
<td>Total</td>
<td>2,745</td>
<td>1,195</td>
<td>680</td>
<td>4,620</td>
</tr>
<tr>
<td>% of total</td>
<td>59</td>
<td>26</td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: BIS Shrapnel 2006

4.3.4 Retail price

The retail price of native animals may be a significant factor influencing their popularity for keeping. Consultations with the Marsupial Society of Australia (Table 4.8a) and review of relevant online fora (Table 4.8b) indicate that a pair of Mitchell’s hopping mice currently retails for approximately $150. As for all pet animals, prices are heavily influenced by the dynamics of supply and demand, and prices are likely to go down once the species becomes more readily available and market competition...
intensifies. This is illustrated by the average retail price of the very similar but more commonly kept spinifex hopping mice, at $57 per pair (Table 4.8c). It is estimated that the production cost of a pair of Mitchell’s hopping mice is currently around $50 (A. Yarde (Marsupial Society of Victoria), pers. comm.), but given that the species is not bred on a commercial scale, this would likely to reduce further following the development of a commercial industry.

Table 4.8a: Retail price of native mammal species kept as pets

<table>
<thead>
<tr>
<th>Species</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>common brushtail possum</td>
<td>$400</td>
</tr>
<tr>
<td>common ringtail possum</td>
<td>$150 - $400</td>
</tr>
<tr>
<td>sugar glider</td>
<td>$150 - $300</td>
</tr>
<tr>
<td>common wombat</td>
<td>$800 - $1000</td>
</tr>
<tr>
<td>fat-tailed dunnart</td>
<td>$150 - $175</td>
</tr>
<tr>
<td>Mitchell’s hopping-mouse</td>
<td>$150</td>
</tr>
<tr>
<td>Tasmanian pademelon</td>
<td>$300 - $400</td>
</tr>
<tr>
<td>rufous bettong</td>
<td>$150 - $250</td>
</tr>
<tr>
<td>red-necked wallaby</td>
<td>$150 - $200</td>
</tr>
<tr>
<td>swamp wallaby</td>
<td>$300</td>
</tr>
<tr>
<td>tammar wallaby</td>
<td>$300 - $350</td>
</tr>
<tr>
<td>eastern grey kangaroo</td>
<td>$50 - $150</td>
</tr>
<tr>
<td>kangaroo island kangaroo</td>
<td>$150 - $400</td>
</tr>
<tr>
<td>red kangaroo</td>
<td>$100 - $200</td>
</tr>
<tr>
<td>western grey kangaroo</td>
<td>$100 - $200</td>
</tr>
</tbody>
</table>

Source: Marsupial Society of Australia, pers. comm.

Table 4.8b Retail price of Mitchell’s hopping mouse (Victoria)

<table>
<thead>
<tr>
<th>Date (2009)</th>
<th>Source*</th>
<th>Retailer</th>
<th>Price</th>
<th># of animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 June</td>
<td>Trading Post</td>
<td>Private</td>
<td>$180</td>
<td>2</td>
</tr>
<tr>
<td>16 June</td>
<td>Trading Post</td>
<td>Amazing Amazon</td>
<td>$220</td>
<td>2</td>
</tr>
<tr>
<td>16 June</td>
<td>Petlink</td>
<td>Private</td>
<td>$130</td>
<td>2</td>
</tr>
<tr>
<td>21 June</td>
<td>Petlink</td>
<td>Private</td>
<td>$90</td>
<td>2</td>
</tr>
<tr>
<td>28 June</td>
<td>Petlink</td>
<td>Private</td>
<td>$150</td>
<td>2</td>
</tr>
<tr>
<td>July</td>
<td>Trading Post</td>
<td>Private</td>
<td>$275</td>
<td>3</td>
</tr>
<tr>
<td>July</td>
<td>Trading Post</td>
<td>Private</td>
<td>$500</td>
<td>6</td>
</tr>
<tr>
<td>October</td>
<td>Trading Post</td>
<td>Private</td>
<td>$100</td>
<td>2</td>
</tr>
<tr>
<td>October</td>
<td>Trading Post</td>
<td>Amazing Amazon</td>
<td>$120</td>
<td>2</td>
</tr>
<tr>
<td>October</td>
<td>Petlink</td>
<td>Private</td>
<td>$80</td>
<td>2</td>
</tr>
<tr>
<td>October</td>
<td>Petlink</td>
<td>Private</td>
<td>$100</td>
<td>2</td>
</tr>
</tbody>
</table>


Table 4.8c Retail price of spinifex hopping mouse (NSW)

<table>
<thead>
<tr>
<th>Date (2009)</th>
<th>Source*</th>
<th>Retailer</th>
<th>Price</th>
<th># of animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 June</td>
<td>Petlink</td>
<td>Private</td>
<td>$70</td>
<td>2</td>
</tr>
<tr>
<td>19 June</td>
<td>Petlink</td>
<td>Private</td>
<td>$80</td>
<td>2</td>
</tr>
<tr>
<td>20 October</td>
<td>Petlink</td>
<td>Private</td>
<td>$50</td>
<td>2</td>
</tr>
<tr>
<td>19 October</td>
<td>Petlink</td>
<td>Private</td>
<td>$50</td>
<td>3</td>
</tr>
<tr>
<td>16 October</td>
<td>Petlink</td>
<td>Private</td>
<td>$50</td>
<td>2</td>
</tr>
</tbody>
</table>

For eastern quolls, the current retail price is hard to determine due to the small number traded, but is estimated at $3000 (A. Yarde, (Marsupial Society of Victoria), pers. comm.). This high retail price is likely to reflect the small scale on which they are currently bred, coupled with the resulting discrepancy between supply and demand. This figure of $3000 is also quoted by some breeders as an appropriate sale price for a parent-reared individual, which would adequately recompense their costs of breeding (T. Evans (breeder), P. Mervin (breeder), pers. comm.). However, the establishment of commercial breeding facilities would be likely to reduce their production cost and retail price. Retail prices for some of the more commonly kept native mammal species provide some guidance (Table 4.8a), but given that eastern quolls are not prolific breeders, prices are likely to remain comparatively high. One private keeper who has bred eastern quolls estimates that it would be feasible to sell a pair of commercially bred parent-raised eastern quolls at 3-4 months of age for around $1000 (B. Allison, pers. comm.).

4.3.5 Retail models

The form of retail model will have a major impact on the commercial viability and operation of the industry, as well as on animal welfare aspects. For keepers, potential sources of native mammals for purchase include commercial breeders, private licence holders or pet shops. Native birds and reptiles can be bought from commercial breeders or in a pet shop in most states, and all states condone their trade between licence holders. Trade is common between private licence holders, and from both commercial breeders and pet shops to private keepers. Trade of native mammals is more restricted. In NSW, for instance, the two (protected) native mammals allowed to be privately kept may not be traded by pet shops. They may be obtained from other licence holders, or from interstate commercial traders or keepers. This section compares breeders and pet shops as the route for keepers to obtain their animals. Trade between private keepers would be likely to continue, but the low level and non-commercial nature of this trade make it unsuitable as the basis for an expanded industry.

Which retail model?

The first model involves pet shops acting as a retail intermediary between breeders and consumers. While sale through pet shops would raise the visibility of native mammals as pets and reach a wider cross-section of the public, there are some major problems with this model from an animal welfare perspective. It requires more movement and potential stress for the animal, which needs to be taken from the breeding colony, transported, and temporarily housed in a retail facility with very limited space. This also increases the likelihood of disease outbreak through stocking animals from different breeders together in the same location, with potentially insufficient quarantining. Importantly, it increases the chance of impulse buying, which is closely associated with poor animal welfare and dumping of pets. Impulse buying involves people (including young children) seeing animals in a shop and wanting one without careful consideration of its needs and how they can be met. Pet shops are often located in densely-populated areas and shopping centres and such buying is highly likely.

The role of pet shops in selling animals is controversial. In NSW, the Animals (Regulation of Sale) Bill23 was recently presented to NSW Parliament. It aimed to reduce impulse buying of pets and support more responsible methods of obtaining them. It called for a ban on the sale of any pets (including cats and dogs) from pet shops, limiting advertisement/classified sales to recognised breeders and those re-homing unwanted pets, and mandatory provision of information about expected costs and responsibilities prior to sales. While the Bill was not passed, the Government’s response was to upgrade the code of practice for pets in pet shops and propose a NSW Parliamentary inquiry into companion animal welfare24. There is, however, a move to allow reptiles in pet shops (as soon as 2010), and a draft code of practice for the private keeping of reptiles is being developed with this change in mind25.

24 www.clovermoore.com/main/?id=2556
These are strong reasons to prefer the second model, in which keepers buy animals directly from the breeder. This has a range of benefits for industry functioning and for animal welfare. It would reduce the potential for disease outbreaks caused by mixing animals from different origins, and reduce potential stress of movement and temporary housing on the animals. It would avoid or reduce impulse buying. Breeders of native animals are generally situated outside city centres, and people will have to make a conscious choice and effort to visit them. This is only likely to happen after the prospective keeper has thought about the different options available and is considering buying a certain species. It would further make the operation of a conservation levy easier, with the levy exacted on each sale from breeder to keeper.

A third “hybrid” model has been put forward by Hopwood (2002), who suggests that native mammals could be sold through a pet shop, but with no animals kept on the premises. Customers could go to a pet shop to obtain information on the different species for sale, potentially watching videos of the animal, their husbandry, and their interactions, and choose an animal accordingly. Upon payment the pet shop would source the animal from a commercial breeder. This model has most of the advantages of the second model, although a disadvantage is that the customer’s decision would be based solely on information/education material provided by the shop, without having the opportunity to see or interact with the different species on sale.

**Supply of equipment and husbandry needs**

One problem with the second model of retail (direct from breeders) is that as well as the animal itself, keepers need equipment and supplies, and these are likely to be bought from pet shops. If pet shops do not themselves sell native mammals, they are unlikely to have the knowledge to support their keeping, such as expertise on appropriate forms of enclosure, food, and bedding. The risk is that animal welfare (and keeper satisfaction) could suffer from poor advice or inappropriate equipment and supplies (J. Sillince (PIAA), pers. comm.). To address this problem it would be important to ensure that there is a link between breeders and certain specified retail shops that take on responsibility for providing advice, education and equipment to support native mammal keeping, including e.g. selling specialist husbandry books and providing information about training courses.

If the animals were sold directly from the breeder to keepers, it would be important for the breeding centre to have a member of staff whose role was public liaison, who would be responsible for providing keepers with the necessary information to support responsible keeping (T. Evans (breeder), pers. comm.). This could include, for instance, providing interested buyers with a tour of the facility to see the animals and learn about their care, behaviour, and welfare needs; educational materials about the animal including booklets or videos; required licence application forms; detailed information on equipment and dietary needs and where to purchase, and expected costs. Required equipment could either be purchased from the breeding centre, or (as above) from specified pet shops.

**Advertising**

There are currently strict limits on commercial breeding and trade of native mammals in Australia, and the majority of transactions are conducted between private licence holders through “word-of-mouth” or keeper societies. Advertising of animals is often viewed as problematic, because it risks exciting interest in keeping animals among those who are unsuitable and who have not properly considered the needs of the animal and their ability to meet them. In NSW, the *Animals (Regulation of Sale) Bill* discussed above sought to prevent the advertising of pets for sale through printed and electronic material in order to reduce irresponsible ownership.

Legal restrictions on trade of native species vary from state to state. In some advertising is restricted to publications of animal keeper societies. For instance, in NSW the *Trade of Fauna Policy* restricts the advertising of pet native animals to publications of an animal keepers’ society of which the keeper is a member. These can be printed or electronic discussion fora or “classifieds” services. The Marsupial Society of Australia and the Marsupial Society of Victoria provide online fora for trade or exchange of

---

native marsupials. Although native mammals are occasionally offered for sale on reptile forums and in online pet classifieds and local newspapers, during this research the only native mammal species regularly encountered for sale in these sources were spinifex and Mitchell’s hopping mice.  

While public advertising by commercial breeders and retailers is clearly problematic, there is a distinction to be drawn between advertising and educational material. If more native mammals were made available for keeping it is important that people are made aware of this, in order to achieve various potential benefits, particularly public awareness. There could be an important role for the distribution via pet shops or other outlets of educational material about the availability for keeping of native mammals and their husbandry requirements, perhaps prepared by a body with appropriate expertise such as the regulatory agency or an approved breeder. Hopwood (2002)’s proposal that pet shops provide prospective keepers with a catalogue describing native mammals available for keeping with photos/videos of each provides a good example of how this could work.

### 4.3.6 Regulatory issues and obstacles

The establishment (or expansion) of native mammal-keeping faces a number of likely challenges posed by current regulation. Most obviously, the tight restrictions on native mammal keeping in many states (outlined in Chapter 3) would need to be relaxed, which would require significant political will, particularly as such a relaxation would be likely to be opposed by a range of animal rights and animal welfare groups (see below) and met with suspicion by many regulators. In Victoria, the eastern quoll, amongst other mammal species (see Appendix C2), was recently proposed for listing on a schedule that would have allowed keeping. However, this proposal was rejected by Victoria’s Department of Sustainability and Environment on the basis of concerns over potential illegal take from the wild.

Regulation of pet keeping differs across the different states and territories. In the absence of standardisation or coordination across the states and territories, which is possible but not particularly likely, this will pose challenges of complexity and uncertainty for trade between the jurisdictions. Finally and perhaps most fundamentally, regulation of the keeping of native animals as pets challenges the divide between conservation and commercial activity that is inherent in current models of wildlife regulation and in the thinking of most regulators and conservationists (Cooney 2008, Cooney and Edwards 2009). The current regulatory apparatus is focused on conservation, which may not be suitable for regulation of a commercial industry, albeit one that has conservation as a fundamental goal of regulation. There is no existing governance framework for an industry that combines conservation goals with commercial use for the pet industry. One basic question is whether such an industry should be regulated by conservation/environment departments, as for native animal keeping currently, or by an industry-focused department, as for wildlife exhibition in NSW, which is regulated by the Department of Primary Industries.

### 4.3.7 Public attitudes

A native mammal pet industry will be susceptible to public perceptions and social attitudes. Animal welfare and animal rights groups such as the RSPCA and Animal Liberation are opposed to the use of native wildlife as pets and have the potential to adversely affect the viability of the industry through lobbying and influencing public and political attitudes. Such special interest groups can be very successful at engendering public and political support (e.g. see Chapple (2005) in relation to management of wild horses). Campaigns from such groups could pose serious hurdles to the establishment of a native pet industry, even if supported by strong technical arguments in support of the conservation benefits. Review of media coverage of the issue of native pets (see Appendix G) indicates that the extreme viewpoints, rather than balanced arguments, gain most coverage. Given the

---

27 All spinifex hopping mice found for sale online were from NSW and all Mitchell’s hopping mice from Victoria, probably due to the spinifex hopping mouse being one of only two protected native mammals that can legally be kept as a pet in NSW by private keepers. As a result, both supply and demand are comparatively high in NSW. Mitchell’s hopping mouse can be privately kept in South Australia, Victoria and the Northern Territory, but Victoria is the only jurisdiction where licensing requirements for the keeping of Mitchell’s hopping mouse are less restrictive than those for spinifex hopping mouse, likely causing the spike in its popularity in Victoria.
significance of the media in influencing public attitudes this is unlikely to assist a reasoned debate. Public health concerns and unfamiliarity with the species are also likely to affect public demand, particularly in the early stages of industry development.

4.3.8 Summary of industry practicalities

Market potential
1. Demand for keeping of native animals, including both eastern quoll and Mitchell’s hopping mouse, could be potentially significant.
2. Mammals are greatly under-represented in keeping of native animals, compared to other taxa. Given that in general mammals are, along with birds, the most widely attractive of pets, there is likely to be strong demand among the public for native mammals as pets if appropriate and attractive species were more readily available.

Sourcing animals
3. For some species, including eastern quoll, sourcing appropriate breeding stock to establish breeding colonies presents a challenge, particularly as ensuring sound genetic structure is likely to require gaining permission to collect some animals from the wild.

Financial costs
4. The current estimated cost of an eastern quoll is high (approximately $3000), which will restrict its popularity for keeping, at least until the market price goes down with increasing availability.

Retail
5. Retailing animals direct from breeders to consumers is more likely to deliver good animal welfare outcomes than sale through pet stores, although there is an important potential role of pet shops in supporting good husbandry through providing equipment and supplies.
6. Public advertising by commercial breeders and retailers is problematic because it risks exciting interest in keeping animals among those who are unsuitable (i.e. who have not properly considered the needs of the animal and their ability to meet them). However, there is a distinction to be drawn between advertising and educational material.
7. Educational material addressing the conservation status of quolls, the option of keeping them, and details on husbandry could be provided by pet shops and other outlets.

Regulation
8. The current regulatory apparatus is not well designed to regulate an industry with conservation as a primary outcome.

Public attitudes
9. These vary widely, with some being firmly opposed to the keeping of native animals, and this could pose obstacles to broader public acceptance.

4.3.9 Conclusion: industry practicalities

Establishment of an industry based on native pets would face a number of likely challenges including supply of animals, regulation, and potential opposition, but would benefit from strong likely demand. Retail models involving sale of native animals directly from breeders to consumers (rather than through pet stores), and accompanied by educational material, are advisable for certain species to promote good animal welfare outcomes.

4.4 Conclusions and recommended regulatory and operating models

4.4.1 Feasibility of native mammals as pets

Some native mammals at least appear suitable for private keeping, including both focal animals assessed in detail for this study. When compared to the exotic predators currently predominantly kept as pets, they offer a range of potential benefits for conservation, including decreased impact on native wildlife, sensitising keepers and the public in general regarding native species and their needs, generating funding for conservation, and safeguarding and expanding captive populations of
threatened or declining species. There are many issues that would need to be carefully addressed to promote good conservation and animal welfare outcomes, and to avoid such problems as illegal trade of threatened species, domestication and directional selection for attractive colour or morphological traits, impulse buying and poor husbandry by keepers. However, there are no problems that appear insuperable, and most could be addressed by coupling relaxation of keeping restrictions with a range of appropriate regulatory safeguards and educational initiatives. Likewise, a nascent industry would certainly face significant challenges, including not least likely vocal opposition from some quarters to relaxation of regulations on keeping, but there are indications demand for native mammals could be strong if they were more widely available. Recommended models for achieving conservation benefits and enabling a well-managed industry while minimising conservation and welfare risks are outlined below.

4.4.2 Conclusion: overall feasibility

Establishing a limited industry based on the expansion of keeping of a range of native mammals appears feasible, and could potentially deliver benefits for conservation without excessive conservation or animal welfare risks. However, this is only likely if the industry is carefully structured and regulated (and not over-regulated), and only with respect to certain species.

4.4.2 Recommended regulatory and operating models

This section draws on the foregoing discussion and analysis to propose recommended regulatory and operating models for an industry based on expanded keeping of native mammals. We realise that regulators and industry stakeholders face a complex set of opportunities and constraints for introducing change to current practice, and are aware that many of the issues explored in this report would require careful examination in different jurisdictions and for different species before changes were made. We thus propose the models set out below as sample models to stimulate thinking and action. They are designed to address the major conservation, welfare, and industry operating issues we have outlined throughout this study, and set out a possible set of solutions. They are not intended as definitive or exclusive models, or to exhaust the range of effective and feasible options on native animal keeping.

Two models are outlined below, one for each of the focal species. While they have much in common, different models are recommended for species of major conservation concern and for those of lesser concern. The major differences are that for species of conservation concern, trading and keeping is tightly linked to conservation activities and outcomes, breeding is carried out within a conservation framework, and more stringent control measures are in place to ensure individual animals can be identified and their provenance known. Such measures are not considered necessary for species of lesser conservation concern.

4.4.3 Model for species of major conservation concern: eastern quoll

**Captive breeding**

*Genetic management*

- As a species of major conservation concern, all breeding of eastern quolls is managed within a single coordinated conservation framework and carried out by a limited number of reputable institutions with appropriate expertise.
- An eastern quoll studbook is established and maintained by the Mainland Eastern Quoll Breeding Group (MEQBG), with advice from ARAZPA and academic experts on the establishment of a breeding management plan to maintain wild-type genetics.

*Regulation of breeders*

- Breeding is restricted to licensed breeders who can demonstrate appropriate expertise, to ensure that the conservation-focused management of current captive colonies is not undermined by poorly
coordinated or commercially-driven breeding, such as for particular colour morphs or behavioural attributes attractive to keepers.

- The state environment/conservation department issues licences authorising sale of the animals bred, with licence conditions including participation in the appropriate conservation-breeding network and adhering to all requirements for identification and registration (see below). Continued issuing and renewal of breeders’ licences is dependent on proper maintenance of the studbook by the group and adherence by members of the breeding group to a coordinated breeding plan that ensures maintenance of wild-type genetics, and mandatory compliance with all relevant animal welfare standards.
- Breeding of animals by private keepers is precluded by de-sexing (see below).
- Commercial breeders may operate to primarily supply the pet market (rather than established with primarily conservation aims), on condition they can demonstrate the appropriate expertise and that they will participate in the conservation-breeding framework established by the MEQBG, and comply with all relevant animal welfare standards.

**Identification, registration and record-keeping**

- Breeders identify each animal with a microchip before sale, and keep records of all births, deaths, and sales.
- A single national registry is established by a suitable body to track movements of animals, modelled roughly on the Exotic Birds Record Keeping Scheme administered by the Commonwealth Department of Environment, Water, Heritage and the Arts.
- Breeders submit records of each animal to the registry, including their provenance and microchip identification, and records of all movements.

**Private keeping**

- In those states where eastern quoll cannot currently be kept (all except SA and NT), eastern quoll is added to the lists of mammals for which conservation/environment departments will issue licences to keep.
- Gaining a licence to keep eastern quolls requires demonstration of appropriate skills and expertise.
- Appropriate licence fees are charged, enabling government to recoup at least part of the cost of regulation.
- All quolls privately kept, without a licence to breed, are de-sexed. If so, this takes place before animals leave the hands of breeders, or keepers are required to demonstrate de-sexing requirements are met as a licence condition.

**Sale of animals**

**Purchasing animals**

- Animals are not on display in or sold via pet stores. Animals can only be bought directly from registered breeders. Breeders are responsible for providing prospective buyers with a written statement of expected costs and responsibilities, and information on welfare and husbandry.
- Equipment, supplies and information including e.g. housing, bedding, food, specialist keeping manuals and information about training are available from the breeder or through specified pet shops that take on responsibility for supporting responsible keeping of native mammals.
- The established pet industry codes of practice for responsible selling of pets, with their enforcement mechanisms, apply to selling of native animals also.

**Advertising and education**

- There is no advertising of the pets through general printed or electronic media, but only through internet sites of specialist networks such as marsupial societies and online keepers’ fora, and through word-of-mouth.
- Educational material about native mammals as pets, including what species can be kept and their husbandry requirements, is prepared by a suitable authority and made available through pet stores as well as other appropriate outlets.
**Conservation levy**

- A conservation levy is charged at point of sale that is returned to support conservation of eastern quoll and its habitat.

**Eastern quoll pilot study**

- A pilot study in one state is initially carried out in order to enable better risk assessment regarding conservation and welfare outcomes. This is restricted to one state to avoid the complexity of cross-jurisdictional regulatory differences.
- This is carried out in NSW, given that the only current significant breeding colony of eastern quoll is Secret Creek Sanctuary, Lithgow, NSW, and the currently restrictive NSW current regulation provides a good test case regarding the impact of the necessary regulatory changes. Other centres keeping eastern quolls that could be involved include Mt Rothwell Sanctuary (Victoria).

The pilot study includes:

- Securing in-principle support from the state environment regulatory agency (DECCW) for a pilot study to assess the impacts of a limited expansion of the keeping of native mammals;
- Establishing a representative advisory committee including the Mainland Eastern Quoll Breeding Group (MEQBG) and representatives of animal welfare organisations (such as the RSPCA), conservation organisations involved in mammal breeding and reintroduction, ecologists, Aboriginal communities, the pet industry, and the regulating agency;
- Preparation of species-specific husbandry and welfare guidelines;
- Featherdale Wildlife Park (east of Sydney) and Sydney Wildlife World could participate in public education in partnership with the MEQBG and DECCW;
- Identification of experienced wildlife handlers (including those who are WIRES-trained (Wildlife Information Rescue and Education Service) for private keeping of quolls.

4.4.4 **Recommended model for species of lesser conservation concern: Mitchell’s hopping mouse**

**Breeding and keeping**

- In some states, as necessary, the species is added to lists of species that may be kept and traded (currently restricted to Victoria, NT and SA).
- Private keepers require a basic keepers’ licence. No specialist expertise is required.
- Private keepers are advised to keep sexes separate to avoid breeding, but may breed and trade small numbers of animals.
- Commercial breeders must hold a commercial breeder’s licence (as currently required in several jurisdictions). Gaining such a licence requires demonstration of appropriate expertise and facilities, and adherence to all relevant animal welfare standards such as relevant codes of practice.

**Identification, registration and record keeping**

- In line with current practice, annual returns from licence holders are required indicating details of breeding events and deaths, and all transfers and sales.
- Records are maintained by state/territory regulating agencies.

**Sale of animals**

- Animals can be purchased directly from other licence holders, through certain specified pet shops, or directly from breeders.
- Licence condition specifies that a minimum of two animals are sold together, due to Mitchell’s hopping mice being social animals that commonly live in colonies of 4-8.
- For specified pet shops that take responsibility for supporting responsible keeping of native mammals, pet shop staff are trained in the husbandry requirements of the species, and are required to provide comprehensive information on animal welfare and husbandry to buyers.
• These pet stores also sell appropriate equipment and supplies (housing, bedding, food) for any species sold.
• Advertising through general media, such as internet or print-based classified ads, and through specialist keeper society fora is allowed.
• A conservation levy is charged at point of sale from commercial breeders that is returned to support conservation of native wildlife and their habitats.
5 Conclusions and Recommendations

These conclusions and recommendations respond to the Terms of Reference for this study, and are aimed at all those with a stake in the debate over the keeping of native animals as pets, including environment and pet industry regulators at state and territory level, the established pet industry, conservationists, wildlife breeders and sanctuary operators, advocates and organisations supporting animal welfare and animal rights, veterinarians and veterinary bodies, animal rescue and rehabilitation groups, and Aboriginal groups concerned with how native animals are managed and treated. They are primarily recommendations regarding outcome rather than process, in recognition of the fact that any process leading to wider acceptance of native mammals as pets will be highly context-specific, and necessarily take different forms in different jurisdictions with varying institutional structures, histories of pet-keeping, and stakeholder opinions.

Overall feasibility

1. Establishing a limited industry based on the expansion of keeping of a range of native mammals appears feasible, and could potentially deliver benefits for conservation without excessive conservation or animal welfare risks. However, this is only likely if the industry is carefully structured and regulated (and not over-regulated), and only with respect to certain species.

Current regulation

2. Private keeping of native mammals as pets is tightly restricted in most jurisdictions in Australia, much more so than keeping of native reptiles and birds. Expanding keeping of native mammals would require legislative or policy change in most states and territories.

Species suitability

3. Eastern quolls are potentially suitable for private keeping, although possibly not as traditional “pets”. As long as keepers are well educated and have appropriate skills, no major welfare or husbandry issues are identified. However, eastern quolls’ susceptibility to toxoplasmosis, relatively short lifespan, low reproductive rate and potentially high cost may raise issues around market demand and financial viability. Their keeping raises potential conservation issues that appear manageable through appropriate regulatory and operating structures.

4. Mitchell’s hopping mouse is a suitable species for widespread keeping as a pet.

Making the industry work for conservation and animal welfare

5. There is a range of potential conservation benefits that could be gained by establishing and expanding the range and extent of keeping of native mammals, particularly where these would replace introduced predators as pets, and there are a number of negative side-effects that such a development could potentially entail, for native wildlife (in the wild) and for the welfare of the species kept.

6. A range of regulatory, educational, and industry structure measures could be used to address the various conservation and animal welfare threats raised by wider mammal-keeping, and to maximise the potential industry contribution to conservation.
Industry practicalities

7. Establishment of an industry based on native pets would face a number of likely challenges including supply of animals, regulation, and potential opposition, but would benefit from strong likely demand. Retail models involving sale of native animals directly from breeders to consumers (rather than through pet stores), and accompanied by educational material, are advisable for certain species to promote good animal welfare outcomes.

Regulatory and operating models

8. For the eastern quoll, and potentially for other species of high conservation concern, a model of regulation and industry operation is adopted that has the following features (as elaborated in Chapter 4):
   • All breeding is managed within a single coordinated, scientifically-based conservation framework that ensures conservation of wild-type genes, maintenance of genetic health (e.g. avoiding inbreeding or outbreeding depression), and avoidance of directional selection in response to commercial pressures (e.g. for unusual characteristics, colour morphs, or docility).
   • Breeding is carried out by a limited number of reputable institutions with appropriate expertise, to ensure conservation and welfare standards are upheld.
   • There is mandatory de-sexing of animals kept by private keepers, to ensure that conservation-focused management of captive colonies is not undermined by poorly coordinated or commercially driven breeding, and that all breeding is appropriate to maintain wild-type genetics and genetic health. This would also vastly reduce the potential for escape/releases to impact on wild populations, as individual escapees could not breed with wild populations or establish feral populations.
   • A specialist keeper’s licence is required for private keeping, which requires demonstration of appropriate knowledge and expertise.
   • Current eastern quoll breeders may be able to sell surplus animals (e.g. males) to raise money for their captive breeding and conservation activities.
   • A compulsory scheme of permanent identification, registration and record-keeping is established. This would enable keepers to be held accountable for offences relating to animals, including escapes/releases; allow verification of animal origins and therefore assist in controlling illegal harvest/trade, and enable monitoring of keeping and detection of potentially problematic trends.
   • Animals can only be bought directly from registered breeders, and are not displayed in or sold by pet stores, to reduce animal welfare impacts of transport and display, minimise risks of disease outbreaks, and avoid impulse buying.
   • There is no advertising of the pets through general printed or electronic media, to reduce the risk of impulse buying.
   • A conservation levy is charged at point of sale, which is used to support conservation projects.
   • A code of practice for keeping of native mammals is developed and applied, with adherence being a licence condition for all keepers and breeders, to promote high animal welfare standards.
   • An initial pilot study is carried out in one state to enable information gathering and better risk assessment.

9. For the Mitchell’s hopping mouse, and potentially for other species of lesser conservation concern, a model of regulation and industry operation is adopted that has the following features, (as elaborated in Chapter 4):
   • Animals may be kept and bred with a basic keeper’s licence, and must submit records specifying births, deaths, and exchanges.
   • Commercial breeding requires a separate commercial breeder’s licence, which requires demonstration of appropriate expertise and facilities.
   • Animals may be sold by commercial breeders, by keepers, or by pet stores.
• For specified pet shops that take responsibility for supporting responsible keeping of native mammals, pet shop staff are trained in the husbandry requirements of the species, and are required to provide comprehensive information on animal welfare and husbandry to buyers.

• A code of practice for keeping of native mammals is developed and applied, with adherence being a licence condition for all keepers and breeders, to promote high animal welfare standards.

• A conservation levy is charged at point of sale from commercial breeders, which is returned to support conservation of native wildlife and their habitats.
# Appendices

## Appendix A1. Summary of consultations

<table>
<thead>
<tr>
<th>Regulatory agencies</th>
<th>Consultations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SA Department of the Environment and Heritage (DEH)</strong></td>
<td>Hannah Dridan &amp; Malcolm Lane (Investigations &amp; Compliance Unit); Sonya Nicholls (Fauna permits); Deborah Kelly (Animal Welfare Unit); Peter Copley (Senior Ecologist, Threatened Species, Nature Conservation Branch)</td>
</tr>
<tr>
<td><strong>QLD Department of Environment and Heritage (DEH)</strong></td>
<td>Annie Moody (Wildlife Branch)</td>
</tr>
<tr>
<td><strong>TAS Department of Primary Industries and Water (DPIW)</strong></td>
<td>Colin Spry (Wildlife Management)</td>
</tr>
<tr>
<td><strong>VIC Department of Sustainability and the Environment (DSE)</strong></td>
<td>Adrian Colman (Biodiversity and Ecosystem Services); Ron Waters (Wildlife Management); Bruce Theodore (Wildlife &amp; Game Licensing)</td>
</tr>
<tr>
<td><strong>WA Department of Environment and Conservation (DEC)</strong></td>
<td>Norm Press (Nature Protection Branch)</td>
</tr>
<tr>
<td><strong>NSW Department of Environment, Climate Change &amp; Water (DECCW)</strong></td>
<td>Ian Hunter (Conservation Policy Unit); Steve Allen (Wildlife Licensing); Dan Lunney (Principal Research Scientist)</td>
</tr>
<tr>
<td><strong>NT Natural Resources, Environment, the Arts &amp; Sport (NRETAS)</strong></td>
<td>David Liddle (Wildlife Management)</td>
</tr>
<tr>
<td><strong>VIC Department of Primary Industry, Bureau of Animal Welfare</strong></td>
<td>Jane Malcolm (Senior Project Officer)</td>
</tr>
</tbody>
</table>

### Captive breeding, sanctuaries, keepers

| **Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA) and Australasian Species Management Program (ASMP)** | Martin Phillips (Executive Director); Chris Hibbard (Manager, ASMP) |
| **Mt. Rothwell Sanctuary, Victoria** | Paul Mervin, Joel Little |
| **Marsupial Society of Australia** | Bob Cleaver (President) |
| **Marsupial Society of Victoria** | Amber Yarde (President) |
| **Secret Creek Sanctuary, Lithgow, NSW** | Trevor Evans (Manager) |
| **Pearedale Conservation Park, Victoria** | Michael Johnson |
| **ZooDoo Wildlife Park, TAS** | Liam Chivers |
| **Native Animal Keepers Consultative Committee (NAKCC) member** | Paul Brien |
| **Private keeper, NSW** | Brett Allison |
| **Private keeper, TAS** | Dianne Moyle |
| **Taronga Conservation Society Australia** | Dr Larry Vogelnest, veterinarian; Dr Karrie Rose, pathologist |
| **Private keeper, NT** | Greg Miles |

### Non-government organisations

| **RSPCA** | Wendy White (Development Manager) |
| **Humane Society International** | Michael Kennedy (Executive Director) |
| **Australian Veterinary Association** | Mark Simpson, Anne Fowler |
| **Animals Australia** | Glenys Oojgyes (Executive Director) |
| **Animal Liberation Australia** | Mark Pearson (CEO) |
| **Australian Alliance for Native Animal Survival Inc. (AANAS)** | Robert Garrou (Elder) |
| **Gundungurra Aboriginal Heritage Association Inc (GAHAI)** | David King |

### Pet industry

| **Amazing Amazon - Pet shop** | Shop owner |
| **Pet Industry Association of Australia** | Dr Joanne Sillince, CEO |
Appendix A2. Phylogenetic tree

Parent taxa for focal species (in bold text)

Kingdom: Animalia
Phylum: Chordata
Subphylum: Vertebrata
Class: Mammalia
Subclass Theria (Therian mammals)

Infraorder Metatheria (marsupial mammals)
**Order Dasyuromorphia (dasyuroid marsupials and marsupial carnivores)**
Order Diprotodontia (kangaroos, possums, wallabies, and relatives)
Order Notoryctemorphia (marsupial moles)
Order Peramelemorphia (bandicoots and bilbies)

**Order: Dasyuromorphia**
Family: Dasyuridae
Subfamily: Dasyurinae
Genus: Dasyurus
Tribe Dasyurini (dasyures, quolls, dibblers, Tasmanian devil, and relatives)

**Genus Dasyurus (quolls)**
Species *Dasyurus albopunctatus* (New Guinean quoll)
Species *Dasyurus geoffroii* (western quoll)
Species *Dasyurus hallucatus* (northern quoll)
Species *Dasyurus maculatus* (spotted-tailed quoll)
Species *Dasyurus spartacus* (bronze quoll)
Species: *Dasyurus viverrinus* (eastern quoll)

Infraorder Eutheria (placental mammals)
Order Rodentia
Suborder Myomorpha (mice, rats, gerbils, jerboas, and relatives)
Superfamily Muroidea
Family Muridae
Subfamily Murinae

Genus *Notomys* (Australian hopping mice and hopping mice)
Species *Notomys alexis* (spinifex hopping mouse)
Species *Notomys amplus* (short-tailed hopping mouse)
Species *Notomys aquilo* (northern hopping mouse)
Species *Notomys cervinus* (fawn hopping mouse)
Species *Notomys fuscus* (dusky hopping mouse)
Species *Notomys longicaudatus* (long-tailed hopping mouse)
Species *Notomys macrotis* (big-eared hopping mouse)
**Species Notomys mitchelli** (Mitchell's hopping mouse)
Species *Notomys mordax* (Darling Downs hopping mouse)
## Appendix B. Legislation and policies on native pets

### Table B1. Major relevant legislation in each state/territory

<table>
<thead>
<tr>
<th>State</th>
<th>Legislation</th>
<th>Regulations</th>
</tr>
</thead>
</table>
| NSW   | National Parks and Wildlife Act 1974  
Threatened Species Conservation Act  
| ACT   | Nature Conservation Act 1980  
| QLD   | Nature Conservation Act 1992  
Nature Conservation (Administration) Regulation 2006 |
| SA    | National Parks and Wildlife Act 1972  
| NT    | Territory Parks and Wildlife Conservation  
Act 2000  
Animal Welfare Act 2007  
Prevention of Cruelty to Animals Act | Territory Wildlife Regulations 2004 |
| VIC   | Wildlife Act 1975  
Prevention of Cruelty to Animals Act 1986  
Prevention of Cruelty to Animals Regulations 1997 |
| TAS   | Nature Conservation Act 2002  
Threatened Species Protection Act 1995  
Animal Welfare Act 1993 | Wildlife Regulations 1999 |
| WA    | Wildlife Conservation Act 1950  
Wildlife Conservation (Reptiles and Amphibians) Regulations 2002 |
<table>
<thead>
<tr>
<th>State</th>
<th>Policy/Code of Practice</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Code of Practice for the housing of caged birds</td>
<td><a href="http://www.dpi.vic.gov.au/dpi/nreninf.nsf/93a98744f6ec41bd4a256c8e00013aa9/e33fd6e6929a0bfca256f0f00b66174/$FILE/AG0978.pdf">http://www.dpi.vic.gov.au/dpi/nreninf.nsf/93a98744f6ec41bd4a256c8e00013aa9/e33fd6e6929a0bfca256f0f00b66174/$FILE/AG0978.pdf</a></td>
</tr>
<tr>
<td></td>
<td>Code of Practice - Private keeping of reptiles</td>
<td><a href="http://www.dpi.vic.gov.au/DPI/nreninf.nsf/9e858661e880ba9e44a256640023eb2/1f999deff11cf4d4ca256f0f00b52b/$FILE/AG1134.pdf">http://www.dpi.vic.gov.au/DPI/nreninf.nsf/9e858661e880ba9e44a256640023eb2/1f999deff11cf4d4ca256f0f00b52b/$FILE/AG1134.pdf</a></td>
</tr>
<tr>
<td></td>
<td>Code of Practice for the keeping of amphibians in captivity</td>
<td><a href="http://www.dpi.vic.gov.au/dpi/nrenfa.nsf/93a98744f6ec41bd4a256c8e0013aa9/7f3d22abe74bd2baca257371007d23ca/$FILE/Amphibian%20Code%20of%20Practice%202006.pdf">http://www.dpi.vic.gov.au/dpi/nrenfa.nsf/93a98744f6ec41bd4a256c8e0013aa9/7f3d22abe74bd2baca257371007d23ca/$FILE/Amphibian%20Code%20of%20Practice%202006.pdf</a></td>
</tr>
</tbody>
</table>
Appendix C. State and territory pet licensing regimes

C1 New South Wales

All native birds, reptiles, frogs and mammals (excepting dingoes) in New South Wales are protected under the National Parks and Wildlife Act 1974 (NPW Act). The National Parks and Wildlife Service (NPWS) manages licensing systems to regulate the keeping, buying and selling of protected species. Native animals that can be kept and traded by holders of the appropriate licence include several species listed as threatened under the Threatened Species Conservation Act 1995. Under section 101c of the NPWS Act it is an offence to buy, sell or possess any protected or threatened fauna (s118) unless you are the holder of the appropriate license or the species is exempt from licensing requirements.

C1.1 Keeping of native animals

The NPWS Act provides for general licensing (s120) to enable private persons to be in possession of protected fauna and to dispose of that fauna other than as a fauna dealer.

Table C1: Number of native bird, reptile, frog and mammal species that can be held privately in captivity and their licensing requirements.

<table>
<thead>
<tr>
<th></th>
<th>Mammals</th>
<th>Birds</th>
<th>Reptiles</th>
<th>Frogs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exempt</td>
<td>1</td>
<td>41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native Animal/Bird Keepers’ Licence Class 1*</td>
<td>2</td>
<td>46</td>
<td>130</td>
<td>45</td>
</tr>
<tr>
<td>Native Animal/Bird Companion Keepers’ Licence</td>
<td>-</td>
<td>46</td>
<td>130</td>
<td>45</td>
</tr>
<tr>
<td>Native Animal/Bird Keepers’ Licence Class 2</td>
<td>-</td>
<td>95</td>
<td>92</td>
<td>29</td>
</tr>
</tbody>
</table>

* All species listed as class 1 species are also allowed to be kept under a Class 2 licence.

Generally, Class 1-listed species can be maintained in captivity by keepers with a basic knowledge of animal husbandry. A person can keep one individual of a Class 1-listed native bird, reptile or frog under a Native Animal Companion Keepers’ Licence (s120). To keep more than one individual of a Class 1 species, a Native Animal Keepers’ Licence - Class 1 is required.

Class 2-listed species require a large commitment in time, and experience in keeping these species is required to successfully maintain them. A Native Animal Keepers’ Licence - Class 2 may be granted subject to the guidelines governing the licensing process. To be eligible to keep birds under a Native Animal Keepers’ Licence - Class 2, applicants must be over the age of 18 years, demonstrate at least 2 years experience keeping birds and be able to provide the appropriate care and housing for the bird they wish to obtain. Class 2 reptiles and frogs may be kept under a Native Animal Keepers’ Licence - Class 2 if an applicant is over the age of 18 years and has demonstrated experience of at least 2 years caring for Class 1 reptiles or frogs. A written application addressing these criteria is required before a Class 2 licence is issued.

The dingo is the only native mammal that is not protected in NSW and that can be kept as a pet without needing a licence from the NPWS. All other native mammals are protected in NSW and you must be licensed by the NPWS to be in possession of them. The NPWS only gives licences for people to keep two species of native mammal as pets: the spinifex hopping-mouse and the plains rat.

Following licensing guidelines, licence applicants must be over the age of 10 years and must have the written consent of a parent or guardian if under 16 years.
C1.2 Breeding and trade of native animals

The buying or selling of exempt species is not subject to any licensing requirements. Under s120 of the NPW Act, Native Animal Keepers’ licence conditions state that approved species can be held and bred as a hobby collection with trade or sale of excess stock occurring between licensees. Holders of a keepers’ licence are not allowed to buy and sell animals as a commercial venture. The licence conditions for fauna keepers prohibit commercial trade by requiring that animals acquired by any means, except those bred by the licensee, must be held for a period of not less than six months before they may be transferred. Native Animal Keepers’ licences issued under s120 of the NPW Act also restrict advertising, except in a publication of an animal keepers’ society of which the licensee is a member, for the disposal or acquisition of protected fauna.

For the commercial trade of native animals, a Fauna Dealer Licence is required under section 124 of the NPW Act. The NPWS will issue the Fauna Dealer (Birds) Licence (FDB) to fauna dealers for commercial trade in 87 protected bird species which have been traditionally traded by licensed fauna dealers. The majority of these species are Class-1 listed species, and Class 2-listed bird species can only be traded by specialist bird breeders, which can be holders of a Native Bird Keepers’ Licence - Class 2 or zoos or interstate breeders. The NPWS will not licence fauna dealers to commercially trade in native mammals, reptiles or amphibians.

C1.3 Interstate import and export of native animals

As native reptiles, amphibians and mammals are not allowed to be traded commercially in NSW, the only way to obtain them is from other NSW Native Animal Keepers’ licence holders, or from interstate commercial traders or keepers. To import or export a native animal from or to another state, an interstate import/export licence is required from the NPWS under s126 of the Act. An import/export licence is not required for the 41 native bird species listed as exempt. Import/export of native animals is only allowed if the interstate keeper or trader holds an appropriate licence or movement permit from their state’s fauna protection agency.

C2 Victoria

In Victoria, it is possible for amateur enthusiasts to keep a range of native animals at home. Which species can be kept and sold is regulated by a licensing system under the Wildlife Act 1975 (section 22(3) and the Wildlife Regulations 2002. Breaching of the licensing conditions, limitations or restrictions is an offence under the Wildlife Act (Part VII).

C2.1 Keeping of native animals

At least 25 native bird species, 7 native reptile species and 5 native amphibians listed under Schedule 5 of the Wildlife Regulations 2002 are exempt from licensing requirements for private keeping, provided that they have been acquired lawfully and have not been taken from the wild (Part 5 – Wildlife Regulations 2002). A number of other native animals may be privately kept under two types of Private Wildlife Licences (Table C2). The Private Wildlife Licence – Basic authorises the holder to possess, keep, breed, buy, sell and dispose of wildlife listed in Schedules 3 & 8 of the Wildlife Regulations 2002. The holder of a Private Wildlife Licence – Advanced is authorised to possess, keep, breed, buy, sell and dispose of wildlife listed in Schedules 3, 4 & 8 of the Wildlife Regulations 2002. Although there are two types of Private Wildlife Licences, the only difference is in the species involved. Applicants for a Private Wildlife Licence – Advanced do not have to meet special criteria except when planning to hold venomous snakes under the licence. Native animals that can be kept under a license include several species listed as threatened in accordance with section 10 of the Flora and Fauna Guarantee Act 1988.
**Update - New wildlife species listings in Victoria**

In October 2009, regulations came into effect in Victoria to make it easier and less expensive to keep some species of wildlife (Department of Sustainability and Environment 2009). Under the new arrangements, a broader range of wildlife may be kept and traded by private and commercial wildlife licence holders. The changes were made to “reduce red tape around the possession and trade of native wildlife and were made following request from the Wildlife Possession and Trade Advisory Committee (WPTAC)” (Department of Sustainability and Environment 2009). The regulations increase the number of species that may be kept without the need for a licence and reduce the cost of a licence for some keepers of wildlife. The Department of Sustainability and Environment (DSE) made these changes in consideration of several factors: the conservation status of each species; availability from legal captive sources (ie. numbers in captivity); the potential demand from licence holders; the ease of husbandry; ease of breeding; risk to human health and safety; the taxonomy of the species; and the potential for the species to establish as a pest in the wild if it escaped from captivity. Eight new native mammal species are now allowed to be kept under a wildlife licence (Private Wildlife Advanced Licence) in Victoria: black striped wallaby, feathertail glider, long-nosed potoroo, plains rat, quokka, southern brown bandicoot, spinifex hopping mouse and squirrel glider. Ten native bird species now no longer require a wildlife licence for native possession (DSE 2009).

<table>
<thead>
<tr>
<th>Number of native species</th>
<th>Mammals</th>
<th>Birds</th>
<th>Reptiles</th>
<th>Amphibians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exempt</td>
<td>-</td>
<td>&gt;25</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Private Wildlife - Basic*</td>
<td>15</td>
<td>53</td>
<td>83</td>
<td>11</td>
</tr>
<tr>
<td>Private Wildlife - Advanced</td>
<td>6</td>
<td>28</td>
<td>37</td>
<td>8</td>
</tr>
</tbody>
</table>

*All species listed as Basic species are also allowed to be kept under an Advanced licence.*
<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Current schedule</th>
<th>WPTAC recommendation</th>
<th>DSE response</th>
<th>DSE rationale</th>
<th>Proposed schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Quoll</td>
<td>Dasyurus viverrinus</td>
<td>Not listed</td>
<td>Schedule 4</td>
<td>Remain off schedule</td>
<td>Concern regarding conservation status. High risk of take from the wild given the high demand for the species from licence holders and the low level of availability from legal sources. Any take from the wild is likely to have a major impact on the long-term viability of wild populations. Conservative approach required.</td>
<td>Not listed</td>
</tr>
<tr>
<td>Spinifex Hopping-mouse</td>
<td>Notomys alexis</td>
<td>Not listed</td>
<td>Schedule 3</td>
<td>Accept at higher schedule</td>
<td>New listing - must enter at schedule that requires the most stringent licensing requirements</td>
<td>Schedule 4 (Part B)</td>
</tr>
<tr>
<td>Black-striped Wallaby</td>
<td>Macropus dorsalis</td>
<td>Not listed</td>
<td>Schedule 3</td>
<td>Accept at higher schedule</td>
<td>New listing - must enter at schedule that requires the most stringent licensing requirements</td>
<td>Schedule 4 (Part B)</td>
</tr>
<tr>
<td>Feathertail Glider</td>
<td>Acrobates pygmaeus</td>
<td>Not listed</td>
<td>Schedule 4</td>
<td>Accept</td>
<td>New listing - must enter at schedule that requires the most stringent licensing requirements</td>
<td>Schedule 4 (Part B)</td>
</tr>
<tr>
<td>Greater Stick-nest Rat</td>
<td>Leporillus conditor</td>
<td>Not listed</td>
<td>Schedule 4</td>
<td>Remain off schedule</td>
<td>Threatened species. High risk of take from the wild due to low availability from legal sources. Any take from the wild is likely to have a major impact on the long-term viability of wild populations. Conservative approach required.</td>
<td>Not listed</td>
</tr>
<tr>
<td>Long-nosed Potoroo</td>
<td>Potorous tridactylus</td>
<td>Not listed</td>
<td>Schedule 3</td>
<td>Accept at higher schedule</td>
<td>New listing - must enter at schedule that requires the most stringent licensing requirements</td>
<td>Schedule 4 (Part B)</td>
</tr>
<tr>
<td>Plains Rat</td>
<td>Pseudomys australis</td>
<td>Not listed</td>
<td>Schedule 3</td>
<td>Accept at higher schedule</td>
<td>New listing - must enter at schedule that requires the most stringent licensing requirements</td>
<td>Schedule 4 (Part B)</td>
</tr>
<tr>
<td>Quokka</td>
<td>Setonix brachyurus</td>
<td>Not listed</td>
<td>Schedule 3</td>
<td>Accept at higher schedule</td>
<td>New listing - must enter at schedule that requires the most stringent licensing requirements</td>
<td>Schedule 4 (Part B)</td>
</tr>
<tr>
<td>Red-tailed Phascogale</td>
<td>Phascogale calura</td>
<td>Not listed</td>
<td>Schedule 4</td>
<td>Remain off schedule</td>
<td>Threatened species. Complex husbandry required. Considered an inappropriate species for captivity.</td>
<td>Not listed</td>
</tr>
<tr>
<td>Silky Mouse</td>
<td>Pseudomys apodemoides</td>
<td>Not listed</td>
<td>Schedule 4</td>
<td>Remain off schedule</td>
<td>High risk of take from the wild due to low availability from legal sources. Any take from the wild may have an impact on the long-term viability of wild populations. Conservative approach required.</td>
<td>Not listed</td>
</tr>
<tr>
<td>Southern Brown Bandicoot</td>
<td>Isoodon obesulus</td>
<td>Not listed</td>
<td>Schedule 4</td>
<td>Accept</td>
<td>New listing - must enter at schedule that requires the most stringent licensing requirements</td>
<td>Schedule 4 (Part B)</td>
</tr>
<tr>
<td>Squirrel Glider</td>
<td>Petaurus norfolcensis</td>
<td>Not listed</td>
<td>Schedule 3</td>
<td>Accept at higher schedule</td>
<td>New listing - must enter at schedule that requires the most stringent licensing requirements</td>
<td>Schedule 4 (Part B)</td>
</tr>
</tbody>
</table>
C2.2 Breeding and trade of native animals

Under part 5 of the *Wildlife Regulations 2002*, both types of Private Wildlife Licenses authorise the holder to breed and sell native animals covered by the license subject to conditions. Under part 2 of the *Wildlife Regulations*, a person must not permit different taxa of wildlife to inter-breed unless those taxa of wildlife are known to inter-breed in the wild (except species listed as exempt in Schedule 6 part A and C of the *Wildlife Regulations 2002*). A Private Wildlife license holder cannot sell or dispose of wildlife from a shop or business premises and must not sell or dispose of an animal that has been in the possession of the license holder for less than six months, unless the animal has been bred by the license holder. Furthermore, trade is only allowed between license holders and both parties involved in the trade must notify the Secretary in writing within 14 days of the buying, acquiring, selling or disposing of wildlife.

With the exception of four native bird species, a Wildlife Dealer licence is required to commercially trade native fauna from a retail outlet, shop, business premises, market stall or home in Victoria. This Commercial Wildlife Licence authorises the holder (subject to conditions) to possess, keep, breed, buy, sell or dispose of a range of live native fauna on a commercial basis (Table B3). All stock must be obtained from in-house breeding or from appropriately licensed persons. All commercial applications are subject to an onsite inspection of the premises (or interview) by a Wildlife Officer. An application for a Commercial Wildlife Licence must also be supported by a Management Plan with detailed plans of the proposed facilities including details of enclosure design, proposed arrangements for handling sick or injured animals, managing breeding in captivity and strategy for placement of animals in case the venture is unsuccessful. The Regulations require licence holders to maintain accurate and up to date records to assist in monitoring wildlife possession and trade. Although there are two types of Commercial Wildlife Licence, the licensing requirements are the same, the only difference being in the taxa of wildlife involved.

Table C3: Number of native animals that can be kept under commercial licence in Victoria.

<table>
<thead>
<tr>
<th>Number of native species</th>
<th>Mammals</th>
<th>Birds</th>
<th>Reptiles</th>
<th>Amphibians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exempt</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Commercial Wildlife - Type 1*</td>
<td>15</td>
<td>92</td>
<td>97</td>
<td>21</td>
</tr>
<tr>
<td>Commercial Wildlife - Type 2</td>
<td>-</td>
<td>9</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*All species listed as Type 1 species are also allowed to be traded under a Type 2 licence.

Under part 6 of the *Wildlife Regulations 2002*, the holder of a Dealer Type 1 Licence may possess, keep, breed, buy, sell or dispose of those taxa of live native animals listed in Schedules 3 and 5. The holder of a Dealer Type 2 Licence may possess, keep, breed, buy, sell and dispose of those taxa of live native fauna listed in Schedules 3, 4 (Part A), 5 & 8 of the *Wildlife Regulations 2002*. Holders of both types of Dealer Licences are allowed to acquire and sell sulphur-crested cockatoos, galahs and long-billed corellas from the holder of a Controller’s Licence endorsed for birds. A Wildlife Controller’s Licence authorises the holder to take, destroy, dispose of or sell nuisance wildlife.

The *Wildlife Regulations 2002* require both Private and Commercial Wildlife licence holders to submit an annual Return for Wildlife. The information contained in these returns gives a state-wide overview of wildlife possession and trade and can be used to help with wildlife management. Failure to keep accurate and up-to-date records is an offence under the *Wildlife Act 1975*.

C2.3 Interstate import and export of native animals

With the exception of four native bird species listed under Part A, Schedule 5 of the *Wildlife Regulations 2002*, an import/export permit is required to transport native animals into or out of Victoria (s50(3) of the Act). Import/export permits are only granted for animals that are “self-sufficient” meaning they are healthy, of a certain minimum age and able to feed themselves. Interstate importers or exporters must comply with the relevant regulations that apply in the state or territory they are trading with.
C3 Northern Territory

The Territory Parks and Wildlife Conservation Act 2000 and the Territory Wildlife Regulations 2004 provide for a permit system to keep certain native animals in captivity within the Northern Territory (NT) of Australia. Native animals that can be kept under the permit system include species listed on the Threatened Species List 2007.

C3.1 Keeping of native animals

Eighteen native bird species, six native reptile species, all common frogs of the NT and the spinifex hopping mouse feature on the NT Exempt Species list and do not require a permit to be kept or sold in the NT (s44(1)). All other animals that are indigenous to the Northern Territory are classed as protected wildlife (s43) and a permit to Keep Protected or Prohibited Wildlife (s55) is required to keep these animals in the NT. Animals that are not indigenous to the NT are known as prohibited entrants (s52). Certain species listed as prohibited entrants may be kept in captivity under a permit to Keep Protected or Prohibited Wildlife, while others classified as restricted species due to their potential to become pests are not allowed to be kept in the NT. Under section 67B of the Act it is an offence to import, export, possess or release a prohibited entrant into or out of the Territory unless the person is authorised to do so under the Act. Applications for a permit to Keep Protected or Prohibited Wildlife are not subject to guidelines, except in the case of venomous snakes and crocodiles. To keep venomous snakes in the NT, people are required to hold a Keep Permit (Category 1-3).

In order to acquire a permit to keep wildlife you must first purchase the animal from a lawful source. A lawful source is identified as a person, pet shop or breeder who has a current permit to Keep and Trade Wildlife. Once an animal has been obtained you must legally obtain a permit to Keep Protected or Prohibited Wildlife within 7 days of receipt of purchase. The Director may refuse to grant a permit under section 56 of the Act. It is an offence for a person to have in his or her possession or under his or her control an animal that is protected wildlife unless the person is authorised to do so under this Act (s66).

C3.2 Breeding and trade of native animals

A permit to Keep Protected or Prohibited Wildlife is also a permit to Trade Protected or Prohibited Wildlife and allows the holder of that permit to trade in any lawfully obtained protected or prohibited animal. The only regulatory difference between a private and a commercial trader is the requirement for a commercial trader to submit monthly return Statements.

A Permit to Take or Interfere with Wildlife is required to take native animals from the wild, including pet trade collection. Written permission of the landholder or relevant lands authority must be obtained prior to a permit application being submitted. Permission must be obtained from the relevant Land Council if an application for a permit involves Aboriginal land. Details of relevant experience must be provided in the application.

C3.3 Interstate import and export of native animals

All protected and prohibited wildlife imported into or exported out of the NT must be approved by both the NT and the state it is leaving or entering. A permit must be issued for the movement of the wildlife before it is consigned. There is no guarantee that a prohibited entrant will be allowed entry into the NT. Under section 66 of the Act it is an offence for a person to bring protected wildlife into, release protected wildlife in or take protected wildlife out of the Territory unless the person is authorised to do so under this Act.
C4 Tasmania

The vast majority of native animals are fully protected in Tasmania under the Nature Conservation Act 2002 and some have additional protection under the Threatened Species Protection Act 1995. The keeping and trade of protected native animals is regulated under a permit system. Failure to comply with conditions or restrictions to which the permit is subject is an offence under section 6 of the Wildlife Regulations 1999.

C4.1 Keeping of native animals

Twelve protected native bird species listed under Schedule 3 of the Wildlife Regulations 1999 are exempt from licensing requirements and may be bought, sold or kept without a permit. An additional nine protected native bird species listed under Schedule 2 of the Wildlife Regulations 1999 and two native parrots listed as endangered under the Threatened Species Conservation Act 1995 can be bought, sold or kept under a Protected Bird Species Permit.

A Herpetology Permit is needed to collect and keep Tasmanian native reptiles and amphibians and holders of a Herpetology Permit are obliged to comply with the Code of Practice for Herpetology. Sixteen native reptile species and eight native amphibians can be kept under a Herpetology Permit. Species protected under the Threatened Species Protection Act 1995 or species that occur within reserved land are not permitted to be disturbed, taken (collected) or possessed. Up to six specimens of each of the common froglet, brown tree frog, metallic skink and spotted skink and all frog eggs and tadpoles are exempt from licensing requirements. Detailed records should be kept on animals taken into captivity, including species, date, number, locality and habitat.

All but four native mammal species are fully protected in Tasmania and cannot be kept privately. The wombat, brushtail possum, Bennett’s wallaby and rufous wallaby are listed under Schedule 4 of the Wildlife Regulations 1999 as partly protected. Under Regulation 17(8) of the Wildlife Regulations 1999, you require a permit to possess wombats whereas you are legally not required to hold a permit for the private keeping of brushtail possums and the two wallabies. However, Tasmanian government policy is to strongly discourage the private keeping of any of these native mammals.

C4.2 Breeding and trade of native animals

The commercial trade of native birds for private use is subject to the same restrictions as those for the keeping of native birds. This means that 12 native bird species are exempt from licensing requirements and nine native birds can be commercially traded under a Protected Bird Species Trading Permit. Reptiles and amphibians cannot be traded commercially in Tasmania, but free exchange between holders of a Herpetology Permit is allowed. Inter-breeding of reptiles and amphibians from different genetic origins (e.g. island and mainland populations) is not permitted. Native mammal trade is restricted to the trade between Exhibition Licence holders and interstate export.

C4.3 Interstate import and export of native animals

An Interstate Import/Export Permit is required for the transport of any native bird, reptile, amphibian or mammal to or from Tasmania. The interstate trade of native mammals is restricted to exhibition licence holders such as Wildlife Parks and does not allow for the import of native animals for private use.

C5 South Australia

South Australia promotes the concept of private people being able to keep any species of native animal as long as the animal is legally acquired and the person has sufficient experience and knowledge and appropriate facilities to keep the animal. The National Parks and Wildlife Act 1972 provides for a permit system to keep native animals (including mammals, birds and reptiles) in captivity (s58). There is no prohibited list of animals in South Australia.
C5.1 Keeping of native animals

All native animals, including threatened species, are classed into one of four fauna schedules. All native animals, except for the 11 species classed as unprotected, enjoy full protection in the wild. The fauna schedules determine the level of permit required to keep and sell any nominated species of native animal (Table C4).

Table C4: Number of native animals that can be kept or sold under a Permit in South Australia.

<table>
<thead>
<tr>
<th>Number of species</th>
<th>Mammals</th>
<th>Birds</th>
<th>Reptiles</th>
<th>Amphibians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unprotected</td>
<td>1</td>
<td>10</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Exempt</td>
<td>3</td>
<td>41</td>
<td>18</td>
<td>2</td>
</tr>
<tr>
<td>Basic</td>
<td>25</td>
<td>76</td>
<td>94</td>
<td>-</td>
</tr>
<tr>
<td>Specialist</td>
<td>All native species not listed as Unprotected, Exempt or Basic</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Unprotected and Exempt - A permit to keep or sell these animals is not required. Unprotected species consist of the dingo and ten common native bird species.

Basic - Animals listed as Basic are common either in captivity or in their natural habitat, the keeping and selling of which has a minimal effect on naturally occurring populations. These animals are usually easy to keep in captivity. A Basic Permit to keep and sell these animals is required. A permit is not required to keep one individual, however the sale or disposal of that individual animal would require a permit.

Specialist - A Specialist Permit to keep and sell is required. These animals are not generally kept in captivity. They are considered to be of high status as a result of illegal trading or demand from trade, and/or animals which require special feeding or housing, and/or animals which are endangered in their natural environment and/or animals which require special expertise for handling and security. Applications for a Specialist Permit are considered on its merits, with special consideration being given to the conservation status and the degree of difficulty in keeping these animal(s). This will include an assessment of facilities and expertise available to manage each species. This assessment may limit the species, quantity, responsibilities or activities a permit holder may undertake in respect of protected species.

C5.2 Breeding and trade of native animals

Both private and commercial keepers are allowed to breed native animals, but under section 19 of the Wildlife Regulations 2001, cross-breeding of a protected animal with an animal of another species or sub-species is not allowed without the approval of the Director of NPW.

There are no restrictions to the trade of unprotected or exempt species. Species can be sold under a Basic or Specialist Permit to keep (s58), but the owner must retain an animal for a period of 6 months prior to sale unless that person has bred the animal. The term "sell" includes swap or give away. If a person wishes to trade (buy and sell) in Basic and Specialist species, under the 6 month required holding period, a Fauna Dealer Permit is required.

A Basic Fauna Dealer Permit entitles the holder to trade in the species on the Basic Species list. Specialist fauna dealers may obtain an endorsement to trade in specialist species. As these animals are of high conservation status, require considerable expertise or experience in their husbandry, or are potentially threatening to the public, the ability of the applicant to house and care for the animals appropriately is assessed when their application is considered. As part of their application for a Specialist Fauna Dealer Permit, applicants need to provide substantial documentation to show a proven ability to establish and maintain accurate recording and administrative systems as well as
demonstrating skills and knowledge in captive animal management, husbandry and species identification. Animals sold under a Specialist Fauna Dealer Permit can only be sold from premises that have been approved by the Director pursuant to section 11 of the Regulations.

Both Basic and Specialist dealers are required to maintain a record book and provide a copy of transactions on a quarterly basis (s9 of the Regulations). The permit number of any person who purchases specialist fauna must be recorded in the record book.

C5.3 Interstate import and export of native animals

Any person who wishes to transport protected animals into or out of South Australia is required to hold an Import or Export Permit (s59). All native animals being imported into South Australia have to be legally obtained from the state of origin.

C6 Queensland

Under the Nature Conservation Act 1992 all native birds, reptiles, mammals and amphibians are protected in Queensland. Some protected bird species feature on an exempt list and may be kept without a licence. A range of other bird, reptile and amphibian species may be kept as pets under a Recreational Wildlife License.

C6.1 Keeping of native animals

Native mammals cannot be kept privately in Queensland.

Twenty-two bird species are listed as exempt in the Nature Conservation (Wildlife Management) Regulation 2006 schedule 3 part 1. A licence is not needed to keep or use a lawfully-obtained exempt animal. You may buy, sell or breed exempt animals, however these species are still “protected” and it is illegal to take them from the wild. Twenty-eight native bird species are listed as controlled animals in the Nature Conservation (Wildlife Management) Regulation 2006 schedule 3 part 2, as controlled animals. Controlled birds can be kept under a Recreational Wildlife Licence for live birds or without a licence if certain requirements are met. Another 80 native bird species are listed in the Nature Conservation (Wildlife Management) Regulation 2006 schedule 3, as either commercial, recreational or restricted species and can also be kept under a recreational wildlife license. Controlled, commercial and recreational animals are usually fairly easy to keep and minimal keeping experience to get a licence.

Twenty-one reptile and 25 amphibian species listed as endangered or vulnerable in the Nature Conservation (Wildlife) Regulation 2006 cannot be kept as pets. All other herpetofauna is listed in Schedule 3 of the Nature Conservation (Wildlife Management) Regulations 2006 as commercial, recreational or restricted and can be kept under a Recreational Wildlife Licence.

Keeping restricted animals, and especially restricted reptiles requires demonstration of considerable experience in handling and husbandry of wildlife. It is not possible to obtain a recreational wildlife licence for restricted reptiles and amphibians unless you are 18 years of age or older.

Holders of a Recreational Wildlife Licence must keep an agency-approved record book. Keeping a protected animal requires compliance with the relevant Code of Practice. There are Codes of Practice for the keeping of protected birds, reptiles and amphibians.
C6.2 Breeding and trade of native animals

A person who holds a Recreational Wildlife Licence may breed animals under the licence. It is an offence to knowingly breed a hybrid or mutation of a protected animal; however, the holder of a Recreational Wildlife Licence may breed a mutation, but not a hybrid, of controlled, commercial and recreational birds. The holder must not breed a mutation or hybrid of a restricted bird or of any species of reptile or amphibian.

A person who holds a recreational wildlife licence may buy or accept, sell or give away animals under the licence; however, a person is not allowed to buy from or sell to someone who does not have a relevant authority. A person who holds a recreational wildlife licence must not keep or use wildlife under the licence for a commercial purpose.

You will need a commercial wildlife licence if you keep, or intend to keep, a protected animal identified as a controlled or commercial animal for a commercial purpose, where the main purpose of your activity is to buy and sell the wildlife. 17 native reptile species and 61 native bird species are listed as commercial or controlled species in schedule 3 of the Nature Conservation (Wildlife Management) Regulation 2006, and can be used commercially under the license. A further 22 native bird species are exempt from commercial licensing requirements. Commercial wildlife licences are not granted for native mammals.

A person who holds a commercial wildlife licence must keep a record book or an electronic record system approved by the chief executive of the regulatory authority.

C6.3 Interstate import and export of native animals

With the exception of moving bird species listed in the Nature Conservation (Wildlife Management) Regulation 2006 schedule 3 part 1 as exempt, it is required to complete a Movement Advice prior to interstate import or export of a protected native animal. In all cases of moving a protected animal interstate, you should contact the wildlife authority in that state to obtain the necessary movement documentation. When a protected animal is moved interstate with the intention to export internationally, a Wildlife Movement Permit is required.

C7 Western Australia

All native animals of Western Australia (WA) are protected under the Wildlife Conservation Act 1950. The Wildlife Conservation Act 1950 provides for taxa of native animals to be specially protected because they are under identifiable threat of extinction. The Department's Policy Statement No 33: Conservation of Threatened Fauna in the Wild covers this area. Under the Wildlife Conservation (Reptiles and Amphibians) Regulations 2002 and the Wildlife Conservation Regulations 1970 certain native herpetofauna and bird species, including several threatened species, can be kept, bred and sold as pets.

C7.1 Keeping of native animals

Native mammals cannot be kept as pets in Western Australia (r28 of the Regulations).

As of March 2003 it is possible for Western Australians to keep reptiles and amphibians as pets after a licence has been obtained. Under regulation 4 of the Wildlife Conservation (Reptiles and Amphibians) Regulations 2002, 41 native reptile and amphibian species are declared to be pet herpetofauna and are classed into one of five categories according to their suitability as pets and their conservation status. Category 1 herpetofauna can be kept without a licence, but currently no species are listed under this category. All other declared pet herpetofauna require a Pet Herpetofauna Keeper’s Licence (Category 2 – 5) to be kept for non-commercial purposes (r5 of the Regulations). All licence applications must include an outline of previous experience and ability in keeping herpetofauna, a description of facilities and written references. For the keeping of species listed as Category 5 herpetofauna, the
nominated premises and the equipment used to keep the Category 5 herpetofauna require inspection by a Wildlife Officer (r6 of the Regulations). All licensees must keep records of the activities carried out under the licence (r8(12) of the Regulations).

Bird licences can be granted to keep native bird species as pets under Regulation 12 of the Wildlife Conservation Regulations 1970. Ten native birds are listed as exempt and can be kept without a licence. Fifty-seven native bird species can be kept under an Avicultural Licence or require no licence when less than a specified number of individuals of these species is kept. An Advanced Avicultural Licence covers the keeping of an additional 18 native bird species. Several Australian native birds declared under the Agriculture and Related Resources Protection Act have the potential to become agricultural pests and require a Permit to Keep Declared Animals (Birds). There is no prohibited list for the keeping of native birds in WA. Minimum aviary specifications apply to 12 bird species kept under a DEC licence.

C7.2 Breeding and trade of native animals

Native mammals cannot be bred or traded for the pet industry in Western Australia.

A Herpetofauna Keeper’s Licence authorises the holder to sell and dispose of not more than the number of animals specified in the licence, to other licencees (r5(2) of the Regulations). For the taking and farming of and the commercial dealing in native herpetofauna for the pet industry, a Pet Herpetofauna Taker’s, Farmer’s or Dealer’s Licence is required (r5 of the Regulations). Under these licences, the 41 native reptile and amphibian species declared to be pet herpetofauna can be taken, farmed and traded for commercial purposes. The nominated premises where all categories of herpetofauna are to be kept will need to be inspected by a Wildlife Officer and the applicant interviewed (r6(2) of the Regulations).

Native birds featuring on the exempt list can be bred and traded without restrictions. Holders of an Avicultural Licence or a Permit to Keep Declared Animals (Birds) are allowed to breed and sell or dispose of the species kept under the licence to other licence holders. Species kept under an Advanced Avicultural Licence can be bred by the licence holder, but cannot be sold or disposed of without the written authority DEC (s12(7) of the Regulations).

Commercial bird traders need to obtain a Bird Dealers’ licence (s13 of the Regulations) to trade in any native bird other than the species featuring on the exempt list. A Basic, Advanced or Special Bird Dealer’s licence is required depending on the species and number of individuals that are being traded. Under section 11 of the Regulations, a Trapper’s Licence may be granted for certain species permitting the holder to take native avian fauna (other than from a nature reserve) for sale.

C7.3 Interstate import and export of native animals

Herpetofauna importer and exporter licences may be granted for the interstate import/export of pet herpetofauna (r5 of the Regulations). With the exception of ten native bird species listed as exempt, an import or export licence is needed to move birds interstate (s18 and s19 of the Regulations). Three native Australian bird species, the Cape Barren goose, the beautiful firetail and the sulphur-crested cockatoo cannot be imported into WA. As no native mammals can be kept or traded within WA, it is illegal to import/export native mammals for private or commercial use.

C8 Australian Capital Territory

The keeping and trading of native animals in the Australian Capital Territory (ACT) is regulated under the Nature Conservation Act 1980. Under the Act, there are heavy fines for failing to obtain relevant licences for animals and the associated activities, and for failing to complete or submit records.
C8.1 Keeping of native animals

Under section 46 of the Nature Conservation Act 1980, a licence is required for the keeping of all native species other than exempt species. Exempt and protected species are listed under the Nature Conservation Declaration of Protected and Exempt Flora and Fauna 2002 (No. 1) made under section 17 of the Nature Conservation Act 1980. A licence is not required to keep, possess, breed, buy, sell or dispose of species listed on the Exempt List. The only native amphibian species that can be kept as pets are five species exempt from licensing requirements.

All native bird species other than ten species listed as protected are exempt from licensing requirements to keep or sell. Ten protected native bird species may be held under a Protected Native Animals Fauna Licence.

All native reptile species other than five species listed as exempt are protected animals and a Protected Native Animal Fauna Licence is required to keep them. Under the Reptile Policy supporting decisions made under the Nature Conservation Act 1980 in relation to activities involving reptiles in the ACT, native reptile fauna is categorised into three groups suitable for hobby purposes. The listing of species depends on their husbandry requirements and level of experience required to keep the species. When assessing licence applications, the listing of the reptile species, the suitability of the premises and equipment, expertise of the applicant and conservation status of the reptile are all taken into account.

All applications to keep protected native animals are requested to outline previous experience and memberships of relevant clubs, to include referees and to submit a husbandry plan which outlines enclosures, requirements for keeping and procedures if health concerns arise. When you are the keeper of animals that require a licence under the Nature Conservation Act 1980, you are required to keep prescribed records.

No native mammals may be kept privately in the ACT.

C8.2 Breeding and trade of native animals

Five amphibian species listed as exempt can be bred, sold or traded without restrictions.

All native bird species, except for ten species listed as protected, are exempt from licensing requirements to breed, sell or trade. For the ten protected native bird species, a Protected Native Animal Fauna Licence is required to breed or trade for private and commercial purposes. The intended seller of a protected bird is required to contact the Licensing and Investigation Department 48 hours prior to the sale. This enables Licensing and Investigation to assess the receiver's suitability. Records must be kept of all animals under a licence.

Under the Reptile Policy, the sale or trade of reptiles in the ACT is restricted to the following circumstances:
- exempt species may be sold or traded without a licence;
- hobbyists may dispose of excess holdings to other herpetologists or scientific and educational institutions with the prior written consent of the Conservator.

As a general guideline, reptiles shall not be traded through commercial outlets in the ACT including pet shops (s2.6 of the Policy).

Native mammals cannot be traded in the ACT.
C8.3 Interstate import and export of native animals

Private keepers must inform the licensing officer prior to importing or exporting any animal into or out of the ACT. All native animals other than exempt animals require a Protected Native Animal Fauna Licence for interstate import and export.

Table C5: Number of native mammal species especially Mitchell’s hopping mouse and eastern quoll, that can be kept as pets under certain conditions in different states and territories.

<table>
<thead>
<tr>
<th>Species</th>
<th>NSW</th>
<th>VIC</th>
<th>NT</th>
<th>TAS</th>
<th>SA</th>
<th>QL</th>
<th>WA</th>
<th>ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitchell's hopping mouse</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Eastern quoll</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Table C6: Number of native mammals species especially Mitchell’s hopping mouse and eastern quoll that can be traded as pets under certain conditions in different states and territories.

<table>
<thead>
<tr>
<th>Species</th>
<th>NSW</th>
<th>VIC</th>
<th>NT</th>
<th>TAS</th>
<th>SA</th>
<th>QL</th>
<th>WA</th>
<th>ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitchell's hopping mouse</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Eastern quoll</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

1 Private Wildlife Basic Licence
2 Permit to Keep Protected or Prohibited Wildlife
3 Basic Permit to keep and sell
4 Specialist Permit to keep and sell
5 Commercial Wildlife Type 1 Licence
6 Permit to Keep or Trade Protected or Prohibited Wildlife
7 Basic Fauna Dealer Permit
8 Specialist Fauna Dealer Permit
Appendix D. Native mammal species that can be kept, bred and sold as pets

Table D1. Australian native mammal species that can be kept, bred and traded *privately* in each jurisdiction and licensing requirements. B=basic licence, A=advanced licence, E=exempt, U=unprotected, blank=cannot be kept.

<table>
<thead>
<tr>
<th>Australian native mammal species</th>
<th>NSW</th>
<th>VIC</th>
<th>NT*</th>
<th>TAS</th>
<th>SA*</th>
<th>QLD</th>
<th>WA</th>
<th>ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>agile wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>antilopine wallaroo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bennett’s wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>black-striped wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>brush-tailed bettong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>common brushtail possum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>common ringtail possum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>common wallaroo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>common wombat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dama wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dingo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eastern grey kangaroo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fat-tailed dunnart</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>feathertail glider</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kangaroo island kangaroo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>kowari</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>long-nosed potoroo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mitchell’s hopping mouse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>parma wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>plains rat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>quokka</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>red kangaroo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>red-bellied pademelon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>red-legged pademelon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>red-necked pademelon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>red-necked wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rufous bettong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rufous wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>southern brow bandicoot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>spinifex hopping mouse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>squirrel glider</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sugar glider</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>swamp wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tammar wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tasmanian bettong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tasmanian pademelon</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>western chestnut mouse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>western grey kangaroo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*All others*                                       |     |     |     |     |     |     |    |     |

Table D2. Native mammal species that can be kept, bred and traded *commercially* in each jurisdiction and licensing requirements. B=basic licence, A=advanced licence, E=exempt, U=unprotected, blank=cannot be kept.
<table>
<thead>
<tr>
<th>Native mammal species</th>
<th>NSW</th>
<th>VIC</th>
<th>NT*</th>
<th>TAS</th>
<th>SA*</th>
<th>QLD</th>
<th>WA</th>
<th>ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>agile wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>antilopine wallaroo</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bennett's wallaby</td>
<td>B</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>black-striped wallaby</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>brush-tailed bettong</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>common brushtail possum</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>common ringtail possum</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>common wallaroo</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>common wombat</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dama wallaby</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dingo</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>eastern grey kangaroo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>fat-tailed dunnart</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>feathertail glider</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kangaroo island kangaroo</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kowari</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>long-nosed potoroo</td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mitchell’s hopping mouse</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>parma wallaby</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>plains rat</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>quokka</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>red kangaroo</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>red-bellied pademelon</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>red-legged pademelon</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>red-necked pademelon</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rufous bettong</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rufous wallaby</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>southern brow bandicoot</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>spinifex hopping mouse</td>
<td></td>
<td></td>
<td></td>
<td>E</td>
<td>E</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>squirrel glider</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sugar glider</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>swamp wallaby</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tammar wallaby</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tasmanian bettong</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tasmanian pademelon</td>
<td>B</td>
<td></td>
<td>B</td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>western chestnut mouse</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>western grey kangaroo</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All others*</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* all species can be kept in principle, subject to permit application
Appendix E. Australasian Species Management Program (ASMP)

As part of their conservation agenda, zoos and aquariums in Australasia who are members of Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA) operate a cooperative network, particularly in the selection and management of the species they hold. The Australasian Species Management Program (ASMP) is ARAZPA's species management arm. Through a large network of position holders working in member zoos, the ASMP provides coordinated management and planning recommendations for species residing in ARAZPA's member institutions. The Mission Statement of the ASMP is: "To plan and manage animal collections cooperatively, in ways that promote sustainability and contribute to species conservation." ASMP activities are monitored and directed by the ASMP Committee. Activities fall into two main areas: strategic regional collection planning, carried out by a series of Taxon Advisory Groups (TAGs) and individual species programs (Conservation Programs, Population Management Programs, Husbandry Programs), coordinated by staff working in ARAZPA member zoos and aquaria.

Under the ASMP:
- the voluntary work of close to 200 zoo and aquarium staff is coordinated across 73 institutions
- 14 Taxon Advisory Groups (TAGs) have been established to provide advice to curators and animal management staff of all ARAZPA members
- more than 100 programs for rare and threatened species are run, including:
  - Conservation Programs: programs with direct links to in situ conservation in which the captive populations run as part of recovery programs
  - Programs currently releasing captive animals to the wild
  - Population Management Programs: programs for sustainable captive populations
  - Husbandry Management Programs: programs for which husbandry techniques and protocols are required
- one of the TAGs is the Monotreme and Marsupial TAG. It collates information on programs, manages studbooks, and prepares annual report and recommendations, and captive management plans.
Appendix F. Particulars of focal species.

Eastern quoll

**Taxonomy**

Subclass: Marsupialia  
Order: Dasyuromorphia  
Family: Dasyuridae  
Genus/Species: *Dasyurus viverrinus*

**Size**

Body length: females 280-400 mm (mean 340); males 320-450 mm (mean 370)  
Tail length: females 170-240 mm (mean 220); males 200-280 mm (mean 240)  
Weight: females 900-1900g (mean 1300); males 700-1100 g (mean 900)  
(Jones 2008)

**Nutrition**

*Wild diet:* Insects, other arthropods, birds, frogs, lizards, and small to medium-sized mammals up to own body size; some vegetation matter (e.g. berries, grasses and fruit) (Blackhall 1980; Jones 2008).

*Captive diet* (Jackson 2003):

Example of daily diet (per animal):

- **Water ad lib.**
- Monday: 2 pilchards and a bone  
- Tuesday: 1/8 Rabbit or ½ rat  
- Wednesday: 2 day-old chicks + 1 raw egg  
- Thursday: ¼ rabbit  
- Friday: food-free day  
- Saturday: 2 mice  
- Sunday: 50g pet health food

Supplements: 3 crickets – 3-4 times per week as available; 5 mealworms – 3-4 times per week; 3 Eukanuba® pet food kibble – once per week; 10g pet health food – once per week; 10g mixed fruit and vegetables – once per week.

**Health**

Known health problems include:

- ectoparasites including mites (*Laelapidae*), ticks (*Ixodidae*) and fleas (*Siphonaptera*) (Green 1989; Green and Scarborough 1990; Holz 2008). One respondent to the survey by Oakwood and Hopwood (1999) noted that dusting for mites was required regularly, and fleas were mentioned by two respondents.
- endoparasitic worms: flukes (*Trematoda*), tapeworms (*Cestoda*) and nematodes (*Nematoda*) (Spratt 1991). One survey respondent noted that worming was required regularly (Oakwood and Hopwood 1999). Flukes and tapeworms in quolls can be treated with anthelmintics commonly used by veterinarians for treatment of cats and dogs (Jackson 2003).
- protozoans including *Toxoplasma gondii* which causes toxoplasmosis, has not been observed in captive quolls (Jackson 2003). However, quolls are known to be highly susceptible to this disease (Holz 2008) and need to be kept strictly separated from known carriers such as cats (T. Evans, P. Mervin, pers. comm.).
- bacterial infections such as *Salmonella* are frequently found (70% of cases) in faeces of Tasmanian dasyurid carnivores, including the eastern quoll (Jones and Rose 2001; Holz 2008).
• Age-related degenerative diseases are common in quolls, commonly resulting in euthanasia after the second breeding season (T. Evans pers. comm.).
  o dasyurids suffer from a disproportionately high number of neoplasms, for unknown reasons (Holz 2008). Tumours have frequently been observed in captive quolls as they age (Jackson 2003; T. Evans, pers. comm.).
  o degenerative lesions of the central nervous system, leading to paralysis and blindness, are known to occur in aged captive individuals (Holz and Little 1995; Holz 2008).
  o aged quolls frequently suffer from degenerative intervertebral disc disease (Holz 2008).
• nutritional osteodystrophy from calcium deficiency in the diet causing metabolic bone disease is common (Jackson 2003; Hume 2005). Signs include growth defects, lameness in gait or posture and in extreme cases dragging of limbs.
• many diseases in captive animals can be traced to inappropriate diets or to extended life spans of captive individuals (Jones and Rose 2001).
• zoonoses
  o respondents to the survey by Oakwood and Hopwood (1999) noted that they had experienced no human health problems such as allergies or infections from handling quolls.
  o Holz (2008) notes that there are several dasyurid diseases that can potentially be transmitted to humans, including atypical mycobacteria that can cause pneumonia in immunocompromised people, and Salmonella spp.

**Housing**

For quolls kept in enclosures, Jackson (2003) recommends the minimum area of enclosure for a pair of eastern quolls is 4.5m length x 4.5m breadth x 2.4m high with an additional floor area of 6.25 m² for each extra animal. Ideally the enclosure should be outdoors to allow adequate natural light and preferably the ability to sunbathe. The enclosure should have mulch, soil or leaf litter as the substrate and should be cleaned daily. A nesting box with nesting material should be provided.

**Reproductive behaviour**

The female may show agonistic responses to the approach of the male, who chases her for long periods of time leading up to oestrus. There can be significant injuries to the female in captivity if she cannot escape (Jackson 2003). Male spotted-tailed quolls and northern quolls have been known to kill and partially consume the intended mate during breeding encounters. Male quolls should be introduced (under supervision) just prior to the breeding season, particularly once the males start calling. If the female appears uninterested, the male can be moved to the next prospective mate’s enclosure, and the process repeated until a receptive female is found. Males should be rotated every few weeks to increase the potential of effective matings (Jackson 2003). It appears that many quoll species do not mate well with individuals that they have regularly housed with, even during the receptive period. Female tiger quolls also do not appear to tolerate being re-mated by the same male, and can become extremely aggressive, unless they have since been mated by a second male (Settle 1978). This may reflect that in the wild they would meet and socialize with a number of different males prior to the breeding season, but do not share dens with males.

**Mitchell's hopping mouse**

**Taxonomy**

<table>
<thead>
<tr>
<th>Subclass</th>
<th>Eutheria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order</td>
<td>Rodentia</td>
</tr>
<tr>
<td>Family</td>
<td>Muridae</td>
</tr>
<tr>
<td>Genus/Species</td>
<td><em>Notomys mitchelli</em></td>
</tr>
</tbody>
</table>
Size
Head and body length: 100-125 (mean 115) mm
Tail length: 140-155 (mean 150) mm
Weight: 40-60 (mean 52) g
(Source: Breed et al. 2008)

Nutrition
Wild Diet: Plant roots, stems, leaves, seeds, insects, spiders, fungi, grass, flowers (Jackson 2003; Breed & Ford 2007; Breed et al. 2008).

Captive Diet (Jackson 2003):
Water ad lib.
Breeding Season: 20 - 25g apple, corn, broccoli, sweet potato, carrot
20 - 25g coarse seed mix
20 - 25g fresh vegetation (grass, browse)
20 - 25g fruit (apple)
2 invertebrates. e.g. mealworms, moths
fresh cut flowers (callistemon, leptospermum, acacia) as available
fungi (mushroom)
Non-Breeding Season: 10 - 15g high fibre vegetables (broccoli, sweet potato, carrot)
10 - 15g coarse seed mix (or acacia/banksia)
10 - 15g fresh vegetation (grass, browse)

Supplements (no specific dietary supplements needed): fungi (mushroom) as available; 1-2 rat and mouse cubes; 1 piece apple, corn or sweet potato; dicalcium phosphate added; soaked or sprouted seed.

Health
Known health problems include:
• Ectoparasitic worms include mites (Laelapidae), ticks (Ixodidae) and fleas (Siphonaptera). They do not cause disease under natural conditions but can be agents for transmitting pathogens between animals
• Endoparasitic worms include tapeworms, roundworms and flatworms
• Toxoplasma gondii is a widespread protozoan parasite that can infect many mammal species including humans. Toxoplasma cysts have been found in the muscle tissue of many rodent species without causing any ill-effects. Little is known of the range of viruses infecting Australian rodents and even less about the effects they have on individual animals and their populations (Breed and Ford 2007).
• Australian rodents held in captivity suffer from some conditions, most of which are due to being kept in less than ideal conditions. Overcrowding can lead to increased stress and aggression between individuals with bite wounds being a significant cause of mortality in captivity. Tyzzer’s disease, a bacterial infection caused by Clostridium piliformis, has been reported in spinifex hopping mice and is thought to be carried asymptomatically by some individuals but can be a significant cause of disease and death in stressed or weak animals. Most intestinal parasites do not appear to cause problems to native rodents in captivity if appropriate hygiene is provided (Breed and Ford 2007).
• Mites can potentially carry the rickettsia Orientia tsutsugamushi, which causes scrub typhus in humans. The mite, Leptotrombidium deliense, is the vector for scrub typhus. Humans bitten by mites carrying the rickettsial bacterium can develop a rash, pneumonia and potentially fatal encephalitis if the disease is not diagnosed and treated. Toxoplasma cysts have been found in the muscle tissue of many rodent species without causing any ill-effects (Breed and Ford 2007).
• Bacteria such as Salmonella and Leptospira, have been shown to be carried by Australian rodents but they are not reported to cause any significant disease in their natural hosts. Rodents can, however, act as a reservoir for bacteria and are capable of transferring them to domestic animals or...
humans. The bacterium *Streptobacillus moniliformis* causes a disease called ‘rat-bite fever’ in humans and has been recorded in captive spinifex hopping mice. Little is known about virus infections in native rodents and the possible effects on the human population (Breed & Ford 2007).

- Hopping mice suffer from few issues relating to stress. Signs of aggression and stress that may be observed include increased vocalization and fighting (Jackson 2003).
- Teeth grow continuously so material suitable for gnawing should be provided including branches and nuts.

**Housing**

Hopping mice can readily be held in displays with a substrate of sand and rocks with grass tussocks. Sawdust or paper should be used as a substrate in holding cages, for maximum hygiene. Minimum recommended enclosure area for a pair of hopping mice is 50 cm length x 50 cm breadth x 40 cm high with an additional floor area of 20 x 20 cm for each additional animal. The enclosure surfaces need to be lined with resistant material such as tin to stop animals chewing through the walls and escaping. Nest areas can be provided by the addition of nest boxes approximately 10x10x10 - 20x20x15cm. They should be kept at room temperature (15 - 25°C) and enclosures should be cleaned every one to two days (Jackson 2003).

**Reproductive behaviour**

The male follows or chases the female then attempts to mate. The male often rides the female while trying to mount and pats the rump of the female during mounting and copulation (Stanley 1971). When mounting the hopping mice appear to lock or tie together (for an average of 106 seconds but ranges from about 12 seconds to nine minutes (Dewsbury and Hodges 1987; Breed 1990a). When mating, the pair generally falls on their side with the female often struggling violently, sometimes dragging the male around the enclosure and even biting him (Breed 1990a).
Appendix G. Media coverage

An internet-based (google) scan of internet and media coverage using the term “native animals as pets” was undertaken, demonstrating the likely influence of the media on public attitudes.

1. Views in favour of native mammals as pets

Increasing public awareness of the existence and needs of native wildlife

"People would no longer be separated from native animals and their environments."
“It would help to save animals from extinction and contribute towards people’s ability to understand them."
"It would contribute to the development of a broader knowledge base for the dietary and care requirements of native animals."

"Wouldn’t it be fantastic if we knew just as much about hopping mice, giant burrowing cockroaches, snake-necked turtles or about a sminthopsis, antechinus or planigale? If more people kept native animals as pets the more they would come to know about the animals and the more they would respect them”. Cheng, Now (a former educator at Taronga Zoo)

"Because people bond with their pets, it would generate interest in why these creatures are going extinct in the bush.” Dr Hopwood
http://www.abc.net.au/science/articles/1999/06/16/29269.htm

“Giders that are bred in captivity typically adjust better than those born in the rainforests of New Guinea and Australia, where they live in colonies of 7 to 12 and coast from tree to tree, eating tree leaves and insects.”
http://wvgazette.com/HomeandStyle/200903050178

“While we are feeding and stroking our moggies and doggies, on the other side of the fence, native species are struggling to survive.”
“Valuing selected native animals as alternative pets to cats and dogs would be another CSU (Conservation through Sustainable Use) strategy, and one I strongly advocate.”
Archer, Mike (2008). Quollity Pets, in Gmagazine, p78.

“Not only would pet ownership result in a vast increase in the population of native animals, it would also result in an ideological shift in the Australian community that would bring it closer to Australian native animals. Instead of seeing themselves as disconnected from the ecosystem, keeping native animals as pets would help Australians feel part of it.”
“They can even strengthen the genetic diversity of their species. This would be particularly helpful for the Tasmanian Devil, which is suffering a cancerous disease caused by having little genetic diversity.”
“Over the next few thousands years, the dominant native animals will be those that are best able to form a symbiotic relationship with the evolution of the human lifestyle. There are an estimated 7.4 million households in Australia. If every household kept one native animal as a pet, then there would be 7.4 million households forming affectionate ideas towards native fauna and 7.4 million households forming a symbiotic relationship with native animals.”
Convict creations, Keeping Australian Native Animals as pets
http://www.convictcreations.com/animals/nativepets.html
Suitability of native mammals as pets

“They have distinct personalities. They have moods, just like us.”

“His hours of activity perfectly suited my own – he wanted to sleep in the middle of the day and night, but was active in the early morning and evening, times I was as keen to play with him as he was with me.”
“I’ve had lots of cats and dogs as pets in my life, but none meant as much to me as he did. After he died, from biting a cane toad in Brisbane, I was an emotional mess for months.”
Archer, Mike (2008). Quollity Pets, in Gmagazine, p78.

”Because they are social animals, they bond very well with humans. They are also intelligent, playful, inquisitive, cute and relatively clean. They eat nectar, fruit, insects and even small rodents, so fit in very well in a suburban backyard”
“If quolls are caught in the wild, their temperament can be quite fierce. But if they are captive-bred they are gentle and socialised.” Dr Paul Hopwood, vet, University of Sydney.
Convict creations, Keeping Australian Native Animals as pets
http://www.convictcreations.com/animals/nativepets.html

Reducing the keeping of exotic species as pets

"Native animals are kinder to the environment and unlike cats and dogs, will not destroy other native animals if they escape captivity.”

“Unlike cats, if they escape, they can easily form a balance with other native wildlife.”
Convict creations, Keeping Australian Native Animals as pets
http://www.convictcreations.com/animals/nativepets.html

2. Views opposed to the keeping of native animals as pets

Risking cruelty through failure to care for welfare of animals and removal of an animal’s right to freedom

"Some native animals are simply not suitable for domestication."
"Native animals might suffer from welfare problems."

"A domesticated native animal cannot be released back into the wild, it would not know where to find food, or what to eat, where to find shelter or how to interact with their own kind."

"These animals are not easy to look after, especially when they reach sexual maturity."
Summerfield, Julie. (2008) Keeping native animals as pets

"They need constant attention, have few survival instincts and even fewer brains.” About the Brolga.
http://www.abc.net.au/rural/telegraph/viewpoint/stories/s824468.htm

“In government submissions, organisations such as The Wildlife Foundation have argued that if native pets were allowed, there would be 'untold suffering of animals and untold heartbreak for many well-intentioned, caring people’”.
Convict creations, Keeping Australian Native Animals as pets
"Many native pets have complex and highly specialised dietary requirements, which ordinary homeowners would find difficult to provide."


"Most disease and illness in natives kept in captivity are due to poor husbandry and people not knowing their needs, diet, temperature, lighting etc."
"The more you know the more you can maximize the chances of your pet’s survival - many species, such as reptiles, do not show their distress clearly and can die slowly in captivity."

Summerfield, Julie (2008) Keeping native animals as pets

“Small, excitable children are typically not good with gliders because they get scared and squish the animal when they hold them, which can cause the gliders to bite.”
“Potential sugar glider owners should carefully research the pet’s needs and be sure they are in a position to provide for them”.

http://wvgazette.com/HomeandStyle/200903050178

“In its government submissions, Animal Liberation (Victoria) claimed: “People procuring these unusual species for ‘pets’ often do so as an indication of social standing, or for a talking point. The animals’ food and behavioural needs are often ignored, or not even known in the first place. Owners prefer cheap and easy method of feeding and housing. Many animals end up dumped and abandoned or sold to a succession of owners.”

Convict creations, Keeping Australian Native Animals as pets
http://www.convictcreations.com/animals/nativepets.html

"It has taken a thousands of years of breeding cats and dogs to what they are today, happily living with humans. But even now, we still have problems with our domestic pets not being looked after properly by a small percentage of the population."


"Wild animals are not domesticated simply by being captive-born or hand-raised. Wild animals, by nature, are self-sufficient and fare best without our interference. The instinctive behaviour of these animals makes them unsuitable as pets."

The Humane society of the United States, Wild animals: Should they be kept as pets?
http://www.hsus.org/pets/issues_affecting_our_pets/should_wild_animals_be_kept_as_pets.html

"The push comes from the pet industry, for obvious profit reasons."
"You see, the pet industry is made up of many commercial bodies. Firstly, the large vet industry and the pharmaceutical companies that sell products for pets; then there are cages and aviaries, leads and collars, bedding and all the rest of it. The big industry, though, is the food industry. It's worth 2 billion dollars annually to them, so of course they look to keep the golden wheels of commerce rolling. Because they know from statistics that they are regularly losing pet owners, they have decided to go for native mammals too."
"The mortality rate and the cruelty involved in trapping, transportation and trading, particularly of birds, is enormous. In 1991 the UK RSPCA and the Environmental Investigation Agency (EIA) ran a double-page spread in The Times to draw attention to the inequities of the European trade in native birds. They named 10 facts to keep you awake at night, and I quote, "One final nightmare statistic: The sum total of all this cruelty is that three wild birds die for every one bird that makes it to a pet shop."

"A wide range of native animals, ranging from the more common species like possums, kangaroos, wallabies, lizards and many species of birds to more rare or threatened species such as bandicoots, koalas and quolls, may be at risk from domestic pets in urban areas."
Summerfield, Julie (2008) Keeping native animals as pets

"Every year millions of birds and reptiles suffer and die on the journey to the pet store. Even after purchase, their lives are likely to be filled with misery."
The Humane society of the United States, Wild animals: Should they be kept as pets?
http://www.hsus.org/pets/issues_affecting_our_pets/should_wild_animals_be_kept_as_pets.html

"If they are not happy, they develop captivity stress. Symptoms of captivity stress include malnutrition, pacing, self-chewing and self-inflicted wounds. In extreme cases, animals will chew off their tails."

**Keeping native pets increases human exposure to new diseases**

"This is not a new occurrence. Many major diseases - influenza, smallpox, tuberculosis etc. - originally came from human contact with animals when pigs, cattle and sheep were domesticated."

"Wild animals also pose a danger to human health and safety through disease and parasites such as rabies, herpes B virus, salmonella."
The Humane society of the United States, Wild animals: Should they be kept as pets?
http://www.hsus.org/pets/issues_affecting_our_pets/should_wild_animals_be_kept_as_pets.html

"The risk of parasite or disease transmission from a wild mammal is significant not only to yourself, but to your pets as well."
Volunteers for Wildlife, Wild animals as pets, USA

**Keeping native pets does not encourage conservation efforts**

"Keeping budgies has not contributed to parrot conservation, nor has the domestication of dogs and cats assisted efforts to conserve the wolf or large cats like the lion and tiger."

“According to two experts (Dr Karen Viggers and Dr David Lindenmayer), if a native pet industry developed, funds would be diverted from far more important conservation projects, such as restoring native habitats and setting aside reserves.”
Convict creations, Keeping Australian Native Animals as pets
http://www.convicetcreations.com/animals/nativepets.html

"Another fear is that unscrupulous breeders could see native species "bastardised" for aesthetic purposes, as has happened with some other non-native pet species."
References


Australian Native Mammals as Pets
A feasibility study into conservation, welfare and industry aspects

by Rosie Cooney, Rosalie Chapple, Sarah Doornbos and Stephen Jackson

Pub. No. 10/072

Threats to survival of mammals in the wild in Australia have prompted the proposition that keeping native mammals as pets could contribute to conservation. This report assesses the feasibility of this proposal.

The study seeks to strategically inform the potential development of an industry based on use of native mammals as pets in a way that helps to ensure positive conservation and welfare outcomes.

The keeping of certain native reptiles, birds and amphibians as pets is reasonably well-established across Australia, however, private domestic keeping of most native mammals is currently prohibited in most States.

The desirability and practicability of a native mammal pet industry has been the subject of much debate and proposals to expand keeping of native mammals face substantial opposition. A diverse range of stakeholders holds varied and often-conflicting values and perspectives. This study provides the first comprehensive and balanced consideration of a complex issue that has to date lacked a well-informed debate.

The report provides a valuable basis for review of policy and legislation relating to private keeping of native animals. This project was funded from RIRDC Core Funds which are provided by the Australian Government.

This report is an addition to RIRDC’s diverse range of over 2000 research publications and forms part of our New Animal Products program, which aims to accelerate the development of viable new animal industries.

The Rural Industries Research and Development Corporation (RIRDC) manages and funds priority research and translates results into practical outcomes for industry. Our business is about developing a more profitable, dynamic and sustainable rural sector.

Most of the information we produce can be downloaded for free from our website: www.rirdc.gov.au. RIRDC books can be purchased from our website <www.rirdc.gov.au> or by phoning 1300 634 313 or online at: www.rirdc.gov.au/eshop.