

Custodianship of wildlife on private land to support conservation – an Australian model

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Abstract. A large proportion of the world's extinctions have occurred in Australia, and threatened species lists continue to grow, notwithstanding government and philanthropic efforts. Most losses have been on private land, so relying on national parks and reserves is not enough to reverse trends and meet Australia's responsibilities. This paper proposes a model that could increase abundance and distribution of Australia's biodiversity, while providing financial incentives to private landholders to do so. It addresses the question, can landholder management of wildlife, and a form of private ownership, remedy shortfalls in government funding for biodiversity conservation and the resulting consequences of vast biodiversity losses? Landholders currently invest in propagating introduced livestock species, but they are prevented by current regulations from investing in a similar manner in threatened Australian native species. Market-based incentives could increase the distribution and abundance of species on private land and help protect the habitat of other biodiversity. The enabling changes would be contentious to some people but are consistent with the International Union for the Conservation of Nature's Sustainable Use policy. Different versions of wildlife privatisation have been successfully applied internationally: there is urgency for Australia to draw on these experiences and develop its own model to encourage and support wildlife on private freehold land. The model proposed in this paper focuses on: identifying locally overabundant populations or captive-bred populations as sources of supply; finding landholders and philanthropists who would like to have custodianship of species; enabling entrepreneurs to respond to demand; and bringing the two together where there is scope for a market-based sharing economy. Encouraging wildlife custodianship on private freehold land would be mutually beneficial, as it would not only result in an increase in biodiversity, but the economic value of wildlife could provide an income to landholders as well as enhancing Australia's conservation system.

Keywords: biodiversity, conservation, habitat restoration, land clearing, private land, sustainable harvesting, threatened species, wildlife custodianship.

Received 13 May 2020, accepted 31 August 2020, published online 8 October 2020

Introduction

Current policies and expenditure on conserving Australian threatened species are not working. Around 6–10% of the world's extinctions, including 35% of the world's modern mammal extinctions, have occurred in Australia (Johnson 2006; Woinarski *et al.* 2019). Threatened species lists continue to grow, notwithstanding government and philanthropic efforts. Expenditure to address need is ~15% of what is needed to avoid extinctions and recover threatened species (Wintle *et al.* 2019). Current strategies include the generation and maintenance of national parks and philanthropically funded reserves. Although necessary and important for conservation, reliance on them is insufficient and species protected in the areas are continuing to be listed as threatened (Figgis *et al.* 2005; Hayward 2011). This is a global issue; the Chair of the World Commission of

Protected Areas, Ernesto Enkerlin Hoeflich, has stated that most protected areas on state-owned lands, while invaluable, are not enough to achieve world conservation targets on their own (Stolton *et al.* 2014).

Australia's lack of improvement led concerned scientists to write to the Prime Minister in 2019 to inform him that Australia was amid an extinction crisis (Radford *et al.* 2019). Fires across eastern Australia in the summer of 2019/20 have made the situation worse (Dickman 2020), and environmental degradation is likely to continue with current carbon emissions (Sherwood *et al.* 2020).

There is a need for innovative biodiversity conservation paradigms and an urgency for Australia to trial new ways to encourage and support wildlife on private freehold land. Tenure or custodianship of wildlife is a vital component of overseas

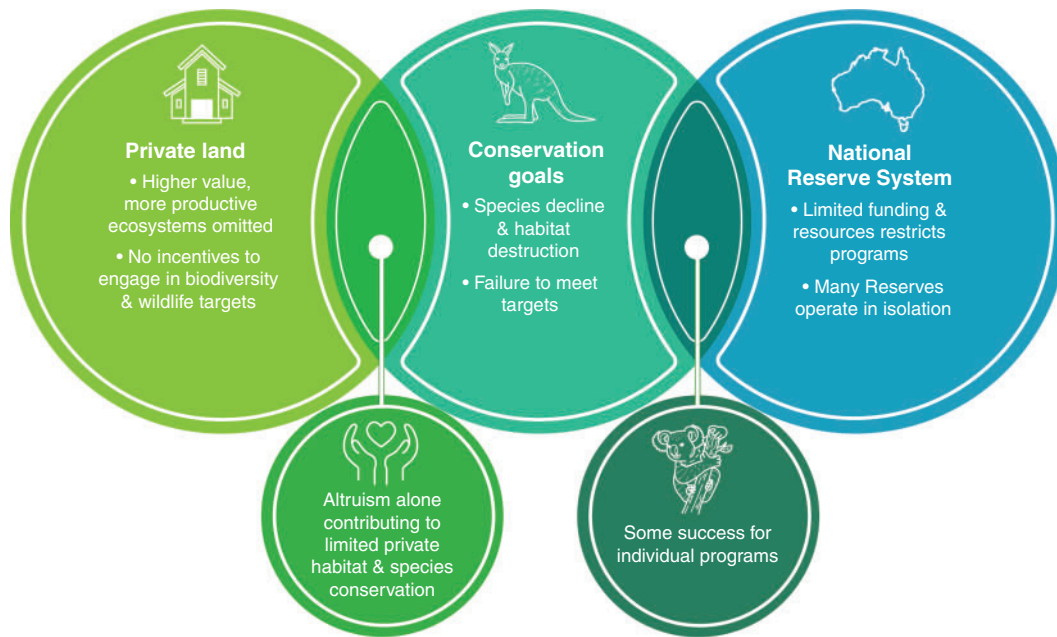


Fig. 1. Private lands are represented on the left, with Australia’s reserve system represented on the right. The two are not integrated, leading to failure of Australia’s conservation goals. There is only a small amount of land dedicated to the National Reserve System relative to the number of species and habitats which need preserving. Under current incentives the role of private land in assisting attainment of conservation goals is limited and based on altruism alone.

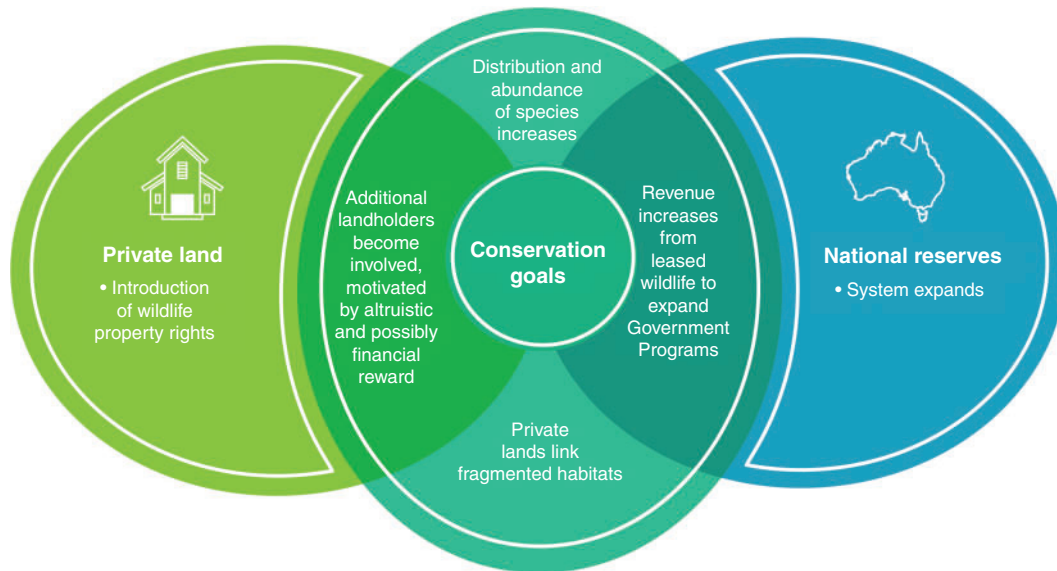


Fig. 2. When landholders have wildlife property rights there can be greater contribution by private landholders of nominated species on private lands (represented on the left). Financial benefits could motivate landholders to contribute to an effective expansion of the National Reserve Scheme (represented on the right) and attainment of larger conservation goals when compared with the current system (reproduced from Wilson *et al.* 2018).

wildlife conservation projects. Fig. 1 shows the current disconnect between the National Reserve System and the role of private lands in achieving national conservation goals. Enabling wildlife custodianship and management of wildlife, previously vested in governments, can lead to innovation, competition and

positive outcomes in species and habitat conservation (Child *et al.* 2012). The application of the concept to Australia could integrate private land more effectively with the objectives of Biodiversity Strategies and National Reserve Programs (Fig. 2). Box 1 details wildlife ownership in Australia and defines

Box 1. Definitions applying to private custodianship of wildlife to support conservation – an Australian model

In Australia, the State Governments (i.e. the Crown) own wildlife; protected animals are the “property” of the State or Crown. Generally “ownership” changes when wildlife is taken under a license, permit or other authority issued or given under a regulation, and under a conservation plan.

In this paper we suggest a form of “private custodianship of wildlife” could apply to living animals on private lands. Private custodianship of wildlife is defined as the duty of a person entrusted with the care of wildlife. Custodianship is distinguishable from other terms of proprietorship as it emphasises a duty of care, which is essential to biodiversity conservation. Other similar terms related to proprietorship that may be incorporated into custodianship policy include the following:

- Management: the control and organisation of wildlife and natural resources which influence wildlife.
- Ownership: Having responsibility for wildlife.
- Property: wildlife or an element of wildlife that belong to a landholder or the legal right to own and use wildlife.
- Right: allowance to do something to or with wildlife, legally or officially.
- Tenure: the conditions under which land or wildlife is owned.

different proprietorship terms relating to wildlife custodianship. Market-based incentives and private custodianship of wildlife have been previously proposed as a potential remedy for shortfalls in government funding for conservation (Wilson *et al.* 2017) but they have not been considered seriously as policy, and we believe further examination and development is required. The principle that property rights could also be applied to sustainable harvesting and consumptive use of abundant and widely distributed species such as kangaroos is discussed elsewhere (Wilson *et al.* 2017).

Innovative methods to manage resources are not new to Australia. Water management reform has been ongoing, with Australia regarded as an exemplar for aggressive pursuit of innovation (Hanemann and Young 2020). In fisheries management, individual transferrable quotas are set by government and allow species-specific total catch; they can be bought, sold and leased (Boyer 2019). Wildlife conservationists and policy makers can learn from these precedents.

Landholders can trade in exotic wildlife such as deer (*Cervus* sp.), alpacas (*Vicugna pacos*), bison (*Bison bison*), and of course domesticated species such as sheep (*Ovis aries*), cattle (*Bos taurus*), horses (*Equus caballus*) and other livestock, but not native species. Legislation, which differs by state, does allow some common species of captive-bred native wildlife, mostly birds and some reptiles, to be kept and traded without a licence. However, for the majority of wildlife species, trade is prohibited (see NSW requirements as an example; NSW Department of Planning, Industry and Environment 2019). Zoos and not-for-profit conservation organisations have special exempting provisions.

State wildlife legislation is further complicated because ownership applies to emus (*Dromaius novaehollandiae*) and crocodiles (*Crocodylus porosus* and *C. johnstoni*) when they are farmed in confined spaces. Kangaroos, wallaroos and some wallabies (*Macropus fuliginosus*, *M. giganteus*, *M. robustus*, *M. rufogriseus*, *M. rufus* and *Thylogale billardieri*) can be sold after they are harvested, but not when they are alive.

In our view, a more objective assessment of these rules and regulations should enable private landholders to have a form of tenure over select species on their properties. It could result not only in an increase in biodiversity, but an additional source of

income, some of which could be fed into conservation. This paper follows discussion at a ‘World Café’ table at the Australian Rangeland Society Conference in Canberra, September 2019 (Box 2), which discussed the following question, can private landholder management of wildlife and a form of private custodianship remedy shortfalls in government funding for biodiversity conservation and the resulting consequences of vast biodiversity losses? The discussion led us to reinvestigate a model that could be adopted by Australia to provide economic incentive to private landholders while increasing Australia’s biodiversity. An earlier version of the model was proposed by Wilson *et al.* (2017).

Our proposal applies to free ranging species (those that need special protection from introduced predators) as well as those that would benefit from prescribed habitat management on landholders’ properties. It enables acquisition of animals, their movement, and freedom for landholders to innovate, just as they can for other animals under their care.

This paper examines current legal obstacles to owning wildlife, the value of wildlife, species to which the proposals could apply and proposes trials to test an Australian model. Encouraging wildlife custodianship on private freehold land would be mutually beneficial, as it would not only result in an increase in biodiversity, but the economic value of wildlife could provide an income to landholders as well as enhancing Australia’s conservation system.

Importance of property rights and private custodianship

Well defined, secure and transferable property rights help to establish and capture the value derived from managing resources, thereby providing an incentive for owners to use and maintain them efficiently (Demsetz 1967). Property rights encourage owners to consider long-term implications of their activities, and so increase the likelihood of sustainable management (Cooney *et al.* 2015). They are consistent with the quote from Jack Lang, ‘[i]n the race of life, always back self-interest; at least you know it’s trying’ (Wikiquote contributors 2019).

Extension of the concept of private custodianship of wildlife and property rights to private landholders is not new. It is important because it motivates wildlife managers to consider the cost of their actions on future availability, and the possibility

Box 2. Summary of the 'World Café' discussion at the Australian Rangelands Conference 2019

Options for custodianship were discussed at one of the tables at a World Café at the Australian Rangeland Society Conference in Canberra in September 2019. The table asked if Australia could emulate overseas experience through the following discussion points.

- Would a form of private custodianship or a lease over wildlife improve biodiversity conservation and create incentives for the use of terrestrial native fauna to be more sustainable?
- Would landholders invest in better management of threatened species (iconic wallabies, numbats, bandicoots, bilbies and koalas) if permitted to do so?

The World Café also considered if the same policies and licensing procedures could be applied to free ranging, abundant species such as kangaroos.

The World Café discussion concluded that it is illogical for private landholders to be able to trade introduced species but not most Australian native species, particularly mammals, and that further action should be initiated to investigate changes that would enable private landholders to interact with and have responsibility for wildlife native to their land.

of overuse. Property rights encompassing private custodianship of wildlife has been implemented internationally, contributing to increases in biodiversity and assisting the recovery of threatened species (Ashley and Barnes 1996).

The allocation of property rights to wildlife is consistent with the findings of the 1961 Arusha Conference (International Union for the Conservation of Nature 1963) for the conservation of Modern African States, which concluded that:

'only by the planned utilisation of wildlife as a renewable natural resource, either for protein or as a recreational attraction, can wildlife conservation and development be economically justified in competition with agriculture, stock ranching and other forms of land use'.

Notwithstanding the general wisdom of these observations, wildlife property rights vary around the world from predominantly state-owned (e.g. Australia) to predominantly private landholder-based (e.g. South Africa). Indigenous ownership responsibility and rights to access wildlife also vary along this spectrum.

Who 'owns' wildlife and is responsible for it?

The delegation of ownership of natural resources is important because it sets rights to access, use, benefit from and sell a given product or experience. If extended to wildlife, custodianship could be translated into rights to manage wildlife for biodiversity conservation. In an ideal world, landholders would do this voluntarily, and although some philanthropists do undertake such tasks, many others require personal benefits. Returns could come from tourism and sale of progeny.

Wildlife ownership laws have developed and evolved under a variety of national circumstances. They incorporate tradition and society, land ownership (public or private), conservation, public awareness or status of the species and resource exploitation. Across the world, there are three main models of 'wildlife ownership' – *res nullius* (no ownership), private ownership, and government ownership; however, these models are not mutually exclusive and there are statutes in place which provide for government ownership rights in what would be considered a private ownership model and statutes that allow for private ownership rights under a government ownership model.

Internationally

In many Western European countries, ownership of wildlife derives from common law and is largely (but not wholly) vested in private landholders. Although there are differences between Scotland and England, government regulation of wildlife in the United Kingdom is relatively minimal. Landholders control most rights to game and fish and routinely charge for hunting and fishing privileges for red and roe deer (*Cervus elaphus*), red grouse (*Lagopus lagopus scotia*), partridge (*Alectoris rufa* and *Perdix perdix*) and pheasant (*Phasianus colchicus*) (Lueck 1989). Where the State controls large acreages of managed forests and hunting areas, it also owns the wildlife.

In North America and India, federal and/or state governments control direct access to, and use of, wildlife (but not wholly). In the United States of America and Canada, the government holds wildlife in a Public Trust Doctrine for their citizens. In India, wildlife is the property of the state government except in National Parks or Sanctuaries, where ownership vests in the national government. Similarly, in the United Kingdom, ownership is not exclusive to one party; in North America, there are circumstances where ownership of some wildlife (e.g. bison) is private.

Wildlife is formally *res nullius* in southern Africa, but 40 years ago South Africa, Zimbabwe and Namibia altered their legal regimes to enable private landholders to effectively exercise rights of ownership after fencing their properties. They have been empowered to manage, use, control access to, and sell wildlife; in this context, the wildlife remains wild, landholders manage the landscape to optimise production and reproduction and can enclose the herd. Regulatory questions arise if landholders want to make wildlife even more commercially valuable, for example by use of artificial insemination to increase fertility or to encourage favourable phenotypes.

*Australia**State and federal legislation*

In Australia, state governments have primary responsibility for the natural resources, including native fauna. The Commonwealth Government has constitutional power over exports, including exports of native fauna, plus responsibility for implementing international treaties. State legislation such as the

Biodiversity Conservation Act 2016 in New South Wales (NSW) protects animals as the property of the Crown until they are lawfully captured or killed. In Queensland, as another example, the *Nature Conservation Act 1992* similarly protects all native animals.

Wildlife ceases to be property of the state when taken under a licence; ownership then transfers to a non-state owner under circumstances which are highly regulated. Thus, governments have hegemony over the management of living wildlife. Neither responsibility nor custodianship are delegated to the property owner responsible for the habitat of the wildlife.

A few species of terrestrial fauna can be used for commercial purposes (for example, kangaroos and emus), exhibited in zoos, moved from one area to another, bred in captivity or farmed. Native fish and other aquatic fauna fall under different legal management regimes allowing greater access to recreational use, commercial utilisation, zoo exhibitions, translocations, breeding and farming.

Zoos require a permit for almost all Australian species, with the condition that the keeping of the animals contributes to education. The animals and their progeny can be sold with the consent of the government and if specific breeding conditions are met.

Some species may be kept as pets, although the regulation process is complex and differs substantially from state to state (Cooney *et al.* 2010). In most jurisdictions keeping of native mammals is more tightly restricted than keeping of native reptiles and birds, and some jurisdictions are more permissive about the keeping of native mammals than others. All may be kept in Northern Territory and South Australia, and none in Queensland, Western Australia, and Australian Capital Territory. In NSW, 41 bird species can be kept as pets without a keeper's licence. Other species require a keeper's licence, and some species cannot be kept at all. Pets may only be obtained from sellers and must not be taken from the wild.

Regulations also control rehabilitation of injured or orphaned wildlife, keeping for scientific purposes and destruction of pest or overabundant wildlife. They allow Aboriginal people to conduct activities in the exercise of their rights under native title and to use resources, including wildlife, for domestic and personal needs (discussed further below).

Potential for licenses under existing legislation

Current wildlife legislation and translocation policies have no specific reference to private landholders. Therefore, there is scope to discuss several policy options that could enable wildlife movement to and from private land. Wildlife could be (1) leased, (2) leased with the goal of breeding or (3) owned (fenced/unfenced). In NSW, for example, legislation enables the creation of licences to do things that would otherwise be offences and thus the Environment Agency Head could grant a Biodiversity Conservation Licence to hold wildlife under one, or all three, of these options. The Head could also enable the translocation of wildlife to private land with associated conditions.

A proposal for an Australian model

Components of a model under which Australian landholders could gain custodianship of wildlife are outlined below. The

description is not exhaustive and further elaboration would require stakeholder consultation.

Scope

The model proposed in this paper focuses on Australia's need given the status of threatened species, population sizes, and the distribution and attributes of public land given over to conservation compared with land in private use.

Approximately 70% of Australian land is privately managed as freehold, leasehold or Aboriginal land, so activities on it are of vital importance to biodiversity conservation, especially given that most threatened ecosystems exist only on private land (Figgis *et al.* 2005). Fig. 3 shows the extent of privately-owned areas and that they are mostly given over to grazing on native vegetation or modified pastures. These are the land uses to which our proposed model would apply with the aim of improving the security of Australian biodiversity.

Guiding principles

We consider that the following principles should guide the development of an Australian model of wildlife custodianship.

1. Use sites that are as unmodified as possible.
2. Use locally abundant (wild, captive or rehabilitated), but nationally scarce, native species, to stock enclosures.
3. Establish a licensing process that considers legal land classification, native title rights, land use, and conservation significance of habitat type for the proposed species.
4. Ensure compliance with animal ethics and welfare standards.
5. Consider experience and training qualifications of participants in translocation and husbandry of wildlife.
6. Base marketing and promotion on transparent monitoring and evaluation.

Implementation

We propose testing and then wider implementation of the model as a two-stage process. The first stage would be a research-based trial under current legislation. The initial trial would involve translocations onto land owned and managed by private landholders, but with government and philanthropic funding support. If this proves to be viable (i.e. if landholders have the ability to translocate species under current legislation), the trial would provide the basis for changes to regulations and policies that would then enable commercial transactions. In the second stage of roll out of the model, candidate species could be those listed on the threatened species list but without recovery plans. Ringma *et al.* (2018) note that there are 29 predator-susceptible taxa remaining unrepresented in predator proof enclosures. Focus would be on non-migratory, terrestrial fauna to reduce the complexity which might arise from federal migratory and marine species legislation.

Objectives of the stage one trial

The purpose of the trial is to test if enabling private custodianship of wildlife on private land will result in more abundant and widely distributed wildlife populations than currently occur under the government-dominated processes which have limited funding. The trial would include several steps, including assessing demand, identifying sources of supply, applying for

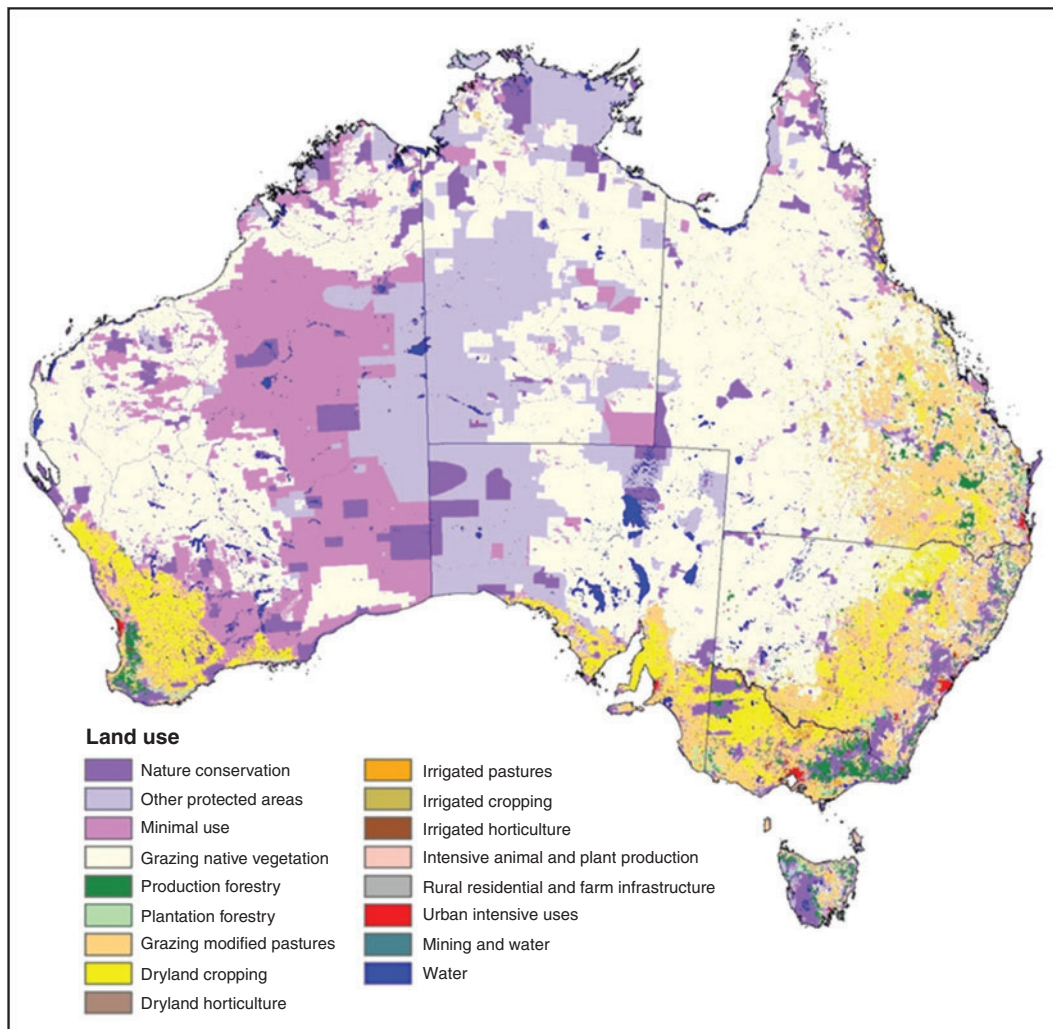


Fig. 3. Australia's land use is classified into several categories and dominated by grazing on native vegetation. If the land use most appropriate to the proposed model includes 'grazing on native vegetation (white)', 'modified pastures (orange)', and other protected areas most of which are in Indigenous ownership (light purple) there is a large covering of land which could be attributed to conservation on private lands (Australian Bureau of Agricultural and Resource Economics and Sciences 2011).

appropriate licences, monitoring and evaluation (see Fig. 4). Some steps would be undertaken by entrepreneurs and innovators, others by governments and regulators. Further research and planning of proposals is needed to bring supply and demand together.

Assessing demand

Ultimately private custodianship could apply to any Australian wildlife, but species which have been previously translocated and become locally overabundant or in need of rehabilitation following fires, could be used to trial the model initially. Interest from private investors would likely be in supporting the more charismatic and iconic species, such as koalas (*Phascolarctos cinereus*) (see Box 3), numbats (*Myrmecobius fasciatus*), quolls (*Dasyurus* spp.), brush-tailed bettongs (*Bettongia penicillata*), rare wallabies and ground dwelling birds; more detail can be found in Wilson *et al.* (2017). Ideally, candidate species would also be extensively

researched so that translocation requirements and maintenance in a new habitat are evidence-based.

Demand could be further assessed from the development of a state or national database of landholders interested in participating and the species that they would like to support. The database could be managed by an interested conservation organisation and could be established from landholder surveys or an open invitation to contribute via newsletters. It could include landholders who already have 'predator proof' fences that have been erected for wild dog management, and which can be upgraded to be effective for fox and cat control.

Predator proof enclosures have recently improved Australian mammal conservation by reducing predation risk (Ringma *et al.* 2018). More are needed across a wider distribution in order to increase the security of animals they contain and reduce the impact of other natural hazards including fire, flood and disease on populations confined to a few sites. These are the facilities that would create demand.



Fig. 4. The proposed process of a trial to enable private custodianship of wildlife would cover an analysis of supply and demand of wildlife on private land, followed by marketing to encourage expansion of the model. Further planning and the inclusion of government regulations would instil confidence in the model.

Box 3. Koalas as an example of a species for trialling private custodianship

Koalas are a potential case study to demonstrate how private landholder custodianship could bring benefits to biodiversity. Their candidature has strengthened following destruction of so much koala habitat and incineration of animals in the fires of eastern Australia in the summer of 2019/20. Even before those events, the conservation status of koalas was in decline, and habitat fragmentation was continuing with consequences such as reduced genetic diversity.

Ironically, koalas have been recorded as overabundant at 16 sites. Culling is out of the question, leaving fertility control, exclusion, habitat management and translocation as the only means to control numbers (Whisson and Ashman 2020). Adoption of the last depends on the availability of suitable sites to which koalas can be translocated. Such sites are in short supply in parks and reserves, however private landholders are interested in meeting the need. The task is to bring overpopulation and the opportunity together and eliminate the intervening impediments.

Private landholders would be even more ready to participate and protect habitat if they had custodianship over the translocated koalas. Regulations or policy changes could first come as a trial which could be extended to an economic model where koalas could be traded amongst landholders and other stakeholders. Such financial incentives could increase the number of landholders involved and in turn increase the numbers and distribution of koalas.

Through these mechanisms private landholders could provide much needed relief to overabundant populations and assist in the redistribution of koalas to their previous ranges in high quality woodlands that have been cleared for agriculture. Furthermore, carefully managed translocations address habitat fragmentation and genetic bottleneck issues. The concept is set out in Figs 1 and 2.

Identifying sources of supply

Over the past 20 years, site specific projects and assisted colonisation with predator management have improved the conservation status of mammal taxa in Australia (Woinarski *et al.* 2014; Ringma *et al.* 2018) and birds in New Zealand (Innes *et al.* 2015). In some of these, emigration and dispersal have been so restricted that further assisted colonisation was needed to avoid damage to habitats. In a few cases, koalas for example, measures such as sterilisation have become necessary (Menkhorst 2008). Potential sources of species for which assisted recolonisation is already underway or planned are suggested by Wilson *et al.* (2017).

Rewilding (an international initiative) is the passive management of ecological succession with the goal of restoring natural ecosystem processes and reducing the human control of landscapes. It can include the reintroduction of key native species, including onto private land (Navarro and Pereira

2015). It has a commercial and legal framework and is functioning effectively in Europe, with a European Wildlife Bank (EWB) which lends herds of wild herbivores for reintroduction into Europe's natural landscapes. The EWB keeps control over its reintroduction herds by making contracts with third parties, mostly private local land managers/landowners. At the expiry of the contract, a proportion of the animals reintroduced are returned to the Bank. It is early days, and although challenges have been observed, there is intention for surplus animals to be available on the market and for investors to receive returns based on the animal's reproductive rate. A similar Australian Wildlife Bank could provide for a supply chain to interested landholders. Without an established 'bank', sources of supply of animals for 'rewilding' into already established predator proof enclosures could initially come from locally overabundant populations, captive-bred populations or those animals in need of rehabilitation.

Licensing or leasing

A licence (for example, a biodiversity licence in NSW) will need to be obtained from the state government for translocation. In addition to a licence, a translocation proposal needs to be submitted for approval in NSW.

Monitoring and evaluating conservation benefit

Trial monitoring and evaluating could follow the 'Saving our Species Monitoring, Evaluation and Reporting Guidelines' for conservation projects (Office of Environment and Heritage 2018). The landholder would be required to monitor access to food, water and shelter, protection from disease and reproductive outputs under the current NSW animal welfare policy for both breeding and released populations. Additionally, the landholder would be required to implement pest and disease management procedures and any genetic management monitoring procedures.

Shwiff *et al.* (2016) provide insight into the benefits and costs of conservation projects and examine several well developed economic techniques to convert benefits and costs into monetary values so they may be compared in a common metric.

Evaluate potential for market based economy

A trial evaluation would assess the extent of supply and demand and the opportunity for interested landholders to receive financial incentives (for example, through sales of live animals, tourism and ethical investments). Where demand and supply come together through a market-based sharing economy, there would be a commercially sustainable wildlife industry based on breeding for conservation and tourism. Governments or conservation agencies responsible for these facilities could lease or sell animals to interested owners and managers of land outside protected areas. The arrangements would be like those applying to zoos or philanthropic organisations breeding threatened species.

Evaluate legislation compliances and challenges

The ability to achieve wildlife custodianship under current legislation will be evaluated, noting the time taken to achieve objectives. Any difficulties or barriers would be identified to assist in moderating bureaucracy and would be included in any review of wildlife policy. A study of water reform in Australia, with all its difficulties and challenges, could provide insights into the nature of the reform processes required.

Scope of potential regulatory requirements

Licenses or leases and registration

A licence, or lease, providing a private landholder with custodianship of a specific species would enable translocation onto the landholders' property. It would enable the holding of the species for breeding and sale of progeny to other (suitably qualified and licenced) private landholders. The licensing process could occur through the current state or territory environment and wildlife departments and could be developed specifically for the private custodianship of wildlife.

Licence conditions could consider property size and relationship to species home ranges. They could also enable neighbours to

work together to combine adjacent wildlife habitats into a single ecological unit for less intensive management (Du Toit 2016).

Governments could put conditions on licenses for selling and buying wildlife. Conditions could include number, age, sex, reproductive condition and who can buy or sell. A training program could be established by the government for interested parties to ensure confidence in licenced dealers. Further confidence could come from property registrations, management plans and monitoring bodies. It may also be necessary to amend legislation in some jurisdictions.

Properties, land types or regions could be registered for nominated species. Properties of a certain size or which meet certain conditions, such as being surrounded by a predator proof fence, could be registered. Registering known areas would make licensing and monitoring easier for landholders to participate in the wildlife custodianship model.

Translocation

Translocations are a widely accepted conservation tool and are not a new concept. The resources for translocations are readily available and should be incorporated into further programs or trials to progress private landholder conservation.

There are several resources to advise on the best translocation practice, including 'Guidelines for Reintroductions and other Conservation Translocations' (International Union for Conservation of Nature Species Survival Commission 2013) and a 'Translocation Tactics Classification System', which has been developed to complement the guidelines and improve the outcomes of bird and mammal translocations (Batson *et al.* 2015). Within Australia, operational translocation policies which refer to the International Union for Conservation of Nature documents have been developed by the states.

Translocation can affect genetic diversity, which needs to be conserved within species so that they can adapt to changing environments. Private custodianship in diverse locations will enable monitoring and managing of genetic diversity. Where animals are sourced from overabundant populations, care would need to be taken to ensure animals are outbred to reduce any bottle-necking events that have already taken place. Specific individuals could be selected for breeding to influence and retain genetic diversity.

Animal welfare

Australian States and Territories also have responsibility for animal welfare. In NSW, translocations must be conducted in accordance with the *Prevention of Cruelty to Animals Act 1979*. The NSW translocation policy lists actions likely to induce stress including capture, health screening, holding, transport and release (including adaptation to a new environment), and recommends understanding how to support the animals throughout the entire translocation process to minimise these stresses (Office of Environment and Heritage 2019). Additional potential stressors must be considered for breeding populations including sensory stimuli and those specific to the confinements. Holding environments should correspond to the natural environment of the animal as much as possible and reduce exposure to stress-inducing situations. Even when released, stress may continue to affect translocated individuals and individuals

Box 4. Summary of native title and potential implications for wildlife custodianship

Native title provides for Indigenous rights and interests in land and waters to be exercised according to traditional law and customs. Under Section 211 of the *Commonwealth Native Title Act 1993*, native title holders' rights of fishing, hunting and food gathering for non-commercial purposes, and cultural and spiritual activities, may be carried out, despite any law or regulation, except where a law confers rights and interests only on, or for, the benefit of the Aboriginal community. Traditional use is referenced in state and territory legislation. For example, in NSW in the *National Parks and Wildlife Act* and regulations.

Native title is extinguished on freehold and most leasehold land, whereas some pastoral leases only partially extinguish native title. If a proponent wanted to manage a native animal on land where native title exists, then they would need to take potential native title into account.

Wildlife species could be the subject of native title if Indigenous owners are the managers or have joint management of the land. These issues have not been addressed in the courts for terrestrial species making the topic a fertile field for the legal fraternity.

In a maritime precedent, the Blue Mud Bay decision by the High Court granted traditional owners exclusive native title rights to the intertidal zone in the Northern Territory. It meant to take fish for commercial sale, a person with a commercial licence also needs to have permission to go into the boundaries of Aboriginal land and the water over aboriginal land (National Native Title Tribunal 2009).

should be monitored for food, water and shelter availability to improve translocation success.

Legal classifications of land types for wildlife custodianship

Land in Australia can be classified as crown land, leasehold (including pastoral leasehold) and freehold. Ownership of crown land is retained by the crown. Pastoral leasehold is a title that allows an area of crown land to be used for the limited purposes of grazing of livestock and associated activities; it is a limited property right and does not provide the leaseholder with all the rights that attach to freehold land. Specific conditions are often attached to pastoral leases, including the type of activity that may be permitted. The primary responsibility for the administration of pastoral leases rests with the relevant state or territory government. Depending on the state/territory, pastoral leases may be for specific terms or held in perpetuity. As specific conditions are often attached to leasehold land, including the type of activity that may be permitted, it would need to be determined on a case by case basis whether or not native wildlife could be introduced onto leasehold land, or if further permissions are required. The purpose of the wildlife on the land, for example for conservation or tourism, may affect whether wildlife can be moved to leasehold land.

Freehold title provides the landholder with unrestricted ownership in perpetuity, and the right to deal with that land, subject to compliance with applicable laws in each state or territory. Private custodianship of wildlife could occur unencumbered on freehold land.

Native title

If native title exists it may have implications for the establishment of wildlife custodianship by private landholders (Box 4). The extent of native title across Australia is shown in Fig. 5.

Management plans and monitoring

Management plans could be developed to demonstrate adherence to translocation policies and to define the future of

offspring. A guideline or code of practice could be developed to assist landholders to implement best management practices. Compliance with management plans could be assessed by institutions or conservation agencies conducting scientific research on the property.

Trade

Governments could put conditions on biodiversity licenses for selling and buying wildlife. Conditions could include number, age, sex, reproductive condition and who can buy or sell. Taking NSW as the example, it is an offence to sell threatened or protected animals under the NSW *Biodiversity Conservation Act 2016* Section 2.5. However, under Division 3 of the same act, Section 2.11, the Environment Agency Head can grant a licence (a biodiversity conservation licence) to a person that authorises the doing of an act that would otherwise constitute an offence under Division 1 or under any other provision of the act. A licence granted under this section could be generated to enable the trade of wildlife.

Discussion

At the Australian Rangelands Society Conference 2019, 'World Café' participants thought that the type of change outlined above would be contentious, but that it would be consistent with the International Union for the Conservation of Nature Policy Statement on Sustainable Use of Wild Living Resources: 'Where an economic value can be attached to a wild living resource, perverse incentives removed, and costs and benefits internalised, favourable conditions can be created for investment in the conservation and the sustainable use of the resource, thus reducing the risk of resource degradation, depletion, and habitat conversion' (International Union for the Conservation of Nature 2000).

History, tradition and social circumstance, conservation status, land tenure (public or private), home-range sizes of species (large versus small) and resource exploitation (Lueck 1989) all have an impact on the laws governing wildlife protection. Some countries have revised their legal frameworks to

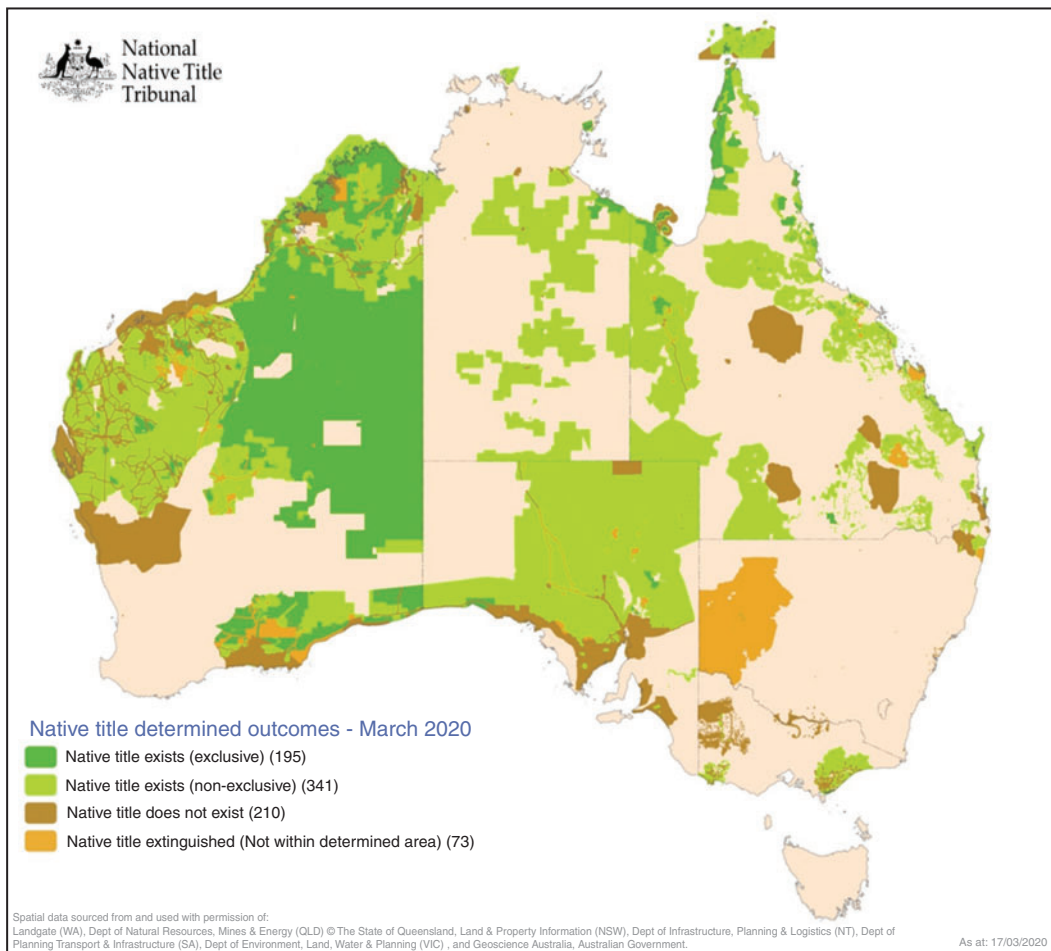


Fig. 5. Native title across Australia is classified as exclusive, non-exclusive, does not exist or is extinguished. The pink shaded area on the map depicts areas where native title applications do not exist. Native title determined outcomes would need to be considered for any landholders granted custodianship of wildlife to ensure any activities comply with native title. Map reproduced with the kind permission of the National Native Title Tribunal (2020).

respond to the current circumstances of wildlife conservation; Australia should do the same. In some states or territories this would require changes to legislative schedules, whereas in others only a change in policy and practice would be required.

On the spectrum of wildlife custodian arrangements between predominantly government and predominantly private, Australia sits closer to India than to South Africa. Although Australian regulations are ultimately set to protect wildlife, they are outdated, and an inhibition to landholders who want to get involved in more active species conservation on their own land. Management through custodianship could enable habitat restoration, reversal of land clearing and resilience in a changing climate.

In Australia, altruism is likely to be the driver for landholders who choose to become involved in arrangements like those outlined in this paper – the same people who make philanthropic donations to Bush Heritage Australia and the Australian Wildlife Conservancy, and who may be encouraged to go further because of the proprietorship opportunity. People breed birds and trade in them because they want to own them, plus the possibility of a (meagre) financial return. The opportunity is

there to extend these motivations beyond the reptile and bird trade to the mammals, recognising that animal welfare and other regulations would need to be science-based and controlled.

Most states have a consultative apparatus in place to channel advice regarding policy changes to the relevant department. Retailing animals direct from breeders to consumers is more likely to deliver good animal welfare outcomes than sale through pet shops, although these may play an important role in supporting good husbandry through provision of equipment and supplies. 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.

Wildlife economics

Generating an economic value for wildlife in the private sector is not a new concept; it has occurred extensively in other jurisdictions. For example, in Namibia, the annual net value from

wildlife on private lands was N\$30.6 million in 1972 and N\$56 million in 1992. In the United States of America, annual spending for wildlife-associated recreation on private land is estimated at \$814 million in day fees and \$1.48 billion for long-term leases (average 2001, 2006, 2011; in 2011 dollars; Macaulay 2016).

Market mechanisms supported by effective regulation are already used for a range of other ecosystem services including biodiversity offsetting, carbon trading, and water shed services that ensure water is allocated efficiently for productive use and/or conservation value (Havemann *et al.* 2016).

Economic value from wildlife on private land in Australia could come from tourism, trade between other private landholders and conservation groups, and biodiversity and carbon credits. Price setting could come from offers to buy eggs or breeding stock from approved custodians. The market could determine the price, and the state determines the number that can be sold and moved.

The economic value of wildlife would feed back into the conservation system. Landholders who earn income from wildlife-based recreational activities are significantly more likely to participate in government conservation programs and to pay for private conservation practices (Macaulay 2016).

Devolved responsibility and property rights could also be applied to sustainable harvesting and consumptive use of abundant and widely distributed species such as kangaroos (Wilson and Edwards 2019). Doing so would encourage landholders to integrate kangaroos into their conventional production systems (Wilson 2004; Cooney 2009). It would also enable them to regard kangaroos as an asset that can play a role in greenhouse gas reduction (Wilson and Edwards 2008). The same principles of sustainable harvest, with strong animal welfare regulation, could encourage habitat protection and conservation of parrots and reptiles on private lands in order to supply existing markets (Wilson and Smetana 1997).

Buying and selling wildlife – the southern African experience

The South African model of wildlife conservation provides a developed platform for buying and selling wildlife (see detail in Cloete *et al.* 2016). Live wild animals can be bought from conservation authorities, boma (enclosure) auctions, catalogue auctions, internet auctions, wildlife capture and marketing enterprises, or directly from wildlife ranches. The animals are transported by the seller, buyer or professional wildlife transporter. Mean price per animal varies with supply and demand. Initially, expansion was rapid, the demand appeared to be insatiable and the turnover of wildlife auctions increased annually. Since 1991 the mean prices paid for various types of wildlife have fluctuated due to a range of factors including animal species, seasonal conditions, tourism and hunting demand, politics, genetics, intensive breeding, disease control, and auction type. Continuing challenges are the manipulation of populations for favourable genetic traits, hybridisation of closely related taxa and inadequate training to improve management (Cloete *et al.* 2016).

The conclusion, however, is that the private wildlife ranching industry has been beneficial to both the conservation of species and the South African economy. Both the value and the number of rare animals on the market have increased.

Complementing government initiatives and collaboration

New wildlife enterprises can bring about additional employment opportunities for rural communities and more resilient, diverse economies. In addition to landholders breeding and selling wildlife for economic and conservation purposes, wildlife enterprises could bring additional jobs to communities in the form of wildlife transport, wildlife infrastructure, veterinary practices, auctioneers, wildlife ‘station’ hands, tourist guides and resource managers. In 2019 the Australian Federal Government established a Future Drought Fund to help farmers and communities prepare and become more resilient. New wildlife enterprises, using species adapted to Australian conditions are prime candidates for these resilience-oriented projects and activities.

Private landholder custodianship methodology would facilitate implementation of the Australian Government ‘Threatened Species Strategy’ (Australian Government 2015). Project developers, public stakeholders, private landholders and the investment community would bring their respective strengths and expertise to the table and collaborate (Huwlyer *et al.* 2016). They would draw on the experiences and knowledge of the management of tourism and wildlife in natural areas (Newsome *et al.* 2002) and apply them to private lands.

The methodology would also assist the NSW State Government, which has begun reintroducing locally extinct mammal species into NSW National Parks with the support of the Australian Wildlife Conservancy and the Wildlife Restoration and Management Partnership led by the University of NSW (NSW Department of Planning, Industry and Environment 2014). In Canberra, the Australian Capital Territory Government is collaborating with Australian National University and seeking philanthropic support to restock Mulligans Flat with threatened species (Australian National University 2015).

Enabling the private sector to collaborate in threatened species management would expand funding raising opportunities for other philanthropic organisations such as the ‘Foundation for National Parks and Wildlife’, the ‘Foundation for Australia’s Most Endangered Species’, ‘Rewilding Australia’, and the ‘Australian Ecosystem Foundation’, all of which have animal breeding and release programs which are chronically under-resourced. The proposal would follow many aspects of the European rewilding precedent.

Conclusion

Our proposed Australian private custodianship of wildlife model taps into a resource that is not currently being used efficiently, would drive economic expansion and encourage innovation. It would build on the limited economic value that wildlife already has in some Australian jurisdictions, such as in zoos, as pets and as a sustainable resource. Governments would cease to be the sole proprietor of native wildlife, as is appropriate in a mixed economy.

Economic value for wildlife on private land in Australia could come from tourism, trade between other private landholders and conservation groups, and biodiversity and carbon credits. The value would feed back into the conservation system, as landholders who earn income from wildlife recreation activities are significantly more likely to participate in government

conservation programs and to pay for private conservation practices. Generating an economic value for wildlife on private land would help drive increases in biodiversity. Australian species could have a greater chance of success in an environment where land clearing has been excessive, and the climate is changing.

Without changes of the sort identified in this paper Australia's wildlife will remain a priceless but, paradoxically, commercially valueless asset managed by small groups of dedicated staff that are largely (under)-funded by governments.

Conflicts of interest

The authors declare no conflicts of interest.

Acknowledgements

We thank all participants who engaged at the 2019 'World Café' Australian Rangeland Society Conference in Canberra, September 2019. Their thoughts and contributions were vital to the development of the model. Peter Gowland, Wendy Craik, Rosie Cooney and Fiona Garland were very active in the discussion at the Café and provided valuable comments on the content of the manuscript. This research did not receive any external funding.

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